City of San Jose

ENVIRONMENTAL ENHANCEMENT PROGRAM

Coyote Creek Streamflow Augmentation Pilot Project

Final Water Quality Monitoring Report For May - November 2000

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July 2001

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Final

Prepared for
Coyote Creek Streamflow Augmentation Pilot Project
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EXECUTIVE SUMMARY

In 1997, the City of San Jose, responding to a NPDES permit requirement to reduce flows from the San Jose/Santa Clara Water Pollution Control Plant (SJ/SC WPCP) to the South Bay, developed a revised South Bay Action Plan (SBAP) to protect and restore saltmarsh habitat for two endangered species in the South San Francisco Bay. The Coyote Creek Streamflow Augmentation Pilot Project in one of the environmental enhancement projects included in the SBAP. This Pilot Project, managed by the City's Environmental Services Department, is an experimental program designed to determine whether the release of recycled water into Coyote Creek during summer low-flow conditions can create and maintain stream conditions that enhance the aquatic environment and support coldwater fish species.

Several sampling programs have been developed to monitor the effects of augmenting the flow of Coyote Creek with recycled water. This report summarizes the water quality effort conducted in Coyote Creek during the months of low creek flow – the same months in which the Pilot Project is planned to operate. The monitoring was conducted to establish pre-operational or baseline conditions for water quality parameters within the creek.

Monitoring was conducted at eight stations in Coyote Creek, two stations in tributaries to Coyote Creek, and at two sources of recycled water on a monthly basis between May and November 2000. The sampling stations were based on the results of an aquatic habitat survey. Where possible, monitoring stations were established at potential spawning sites along a 10-mile stretch of Coyote Creek, including two stations that are upstream of the proposed release point.

Fifty-five water quality parameters were measured from grab samples during each sampling event, but not at every monitoring station. *Giardia* and *Cryptosporidium* were measured only at Charcot, Singleton, and TPS. Organophosphorus pesticides (chlorpyrifos, diazinon, and malathion) were measured in July and only at the Charcot and Watson Park

Downstream sites. Dissolved mercury and zinc were not measured at any of the sites at any time. YSI and HydroLab continuous multi-parameter meters were deployed on a “week on/week off” basis at Charcot, Kelley Park, and Singleton sites. YSI and HydroLab continuous meters were deployed in tandem at the Kelley Park and Singleton sites, with the Charcot site having only a YSI continuous meter. Continuous temperature plotters were deployed at Charcot, Hellyer, Kelley Park, Singleton, Penitencia, Watson Park Upstream, and TPS.

Environmental Service Department and Tetra Tech, Inc. staff collected grab samples from mid-creek at each monitoring station.

The results for each parameter were compared to the lowest applicable water quality criteria and to the water quality of the recycled water. The regulatory criteria that were used in this comparison were chosen from:

- California Toxics Rule (CTR) for freshwater and human health (Federal Register May 2000) and
- Water Quality Criteria Plan for the San Francisco Bay Basin (Basin Plan 1995)

For water temperature, the recorded values were compared to the appropriate California Department of Fish and game cold-water guidelines (Raleigh, *et al.,* 1984, 1986; Rich 1987) for the monitoring period.

RESULTS AND CONCLUSIONS

The overall water quality and toxicity assessment of Coyote Creek and its two main tributaries during the 2000 monitoring season determined that Coyote Creek is an impaired waterbody. This impairment is the result of elevated temperatures and extremely high pathogen levels. And, as such, the creek would not meet beneficial use criteria as specified by the CDFG for a cold-water fishery or the Basin Plan for human contact. Releasing chilled, recycled water into the creek would lower local creek temperatures and dilute pathogen and metal concentrations, resulting in overall habitat improvement.

Temperature - While there are no existing water quality criteria for temperature in ambient waters, one of the beneficial uses of Coyote Creek is to encourage the return of salmonid fish species. This requires that the water quality meet the biological needs of a cold-water fishery. Current CDFG guidelines indicate that the ambient temperatures of the water in Coyote Creek are too high to sustain a cold-water fishery. One of the requirements of releasing recycled water into the creek is that it be artificially cooled to meet CDFG guidelines prior to release. The continuously monitored water temperatures collected from sites along the creek, in conjunction with the air temperature data, will provide data appropriate to complete the final design specifications for the cooling and chilling equipment.

Nutrients - Nutrient concentrations in the creek were generally much lower than those in the recycled water. There was no apparent evidence of nuisance algal blooms occurring in the creek even though nutrient concentrations were elevated enough to saturate the requirements of *Cladophora,* the predominant algae living in the creek (Dr. Rhea Williamson 2001). This indicates that nutrients are not the factors that are responsible for limiting algal and plant growth in Coyote Creek and that releasing recycled water into the creek is not expected to result in nuisance algal blooms.

Pathogens - Pathogen concentrations along the creek were exceedingly high, with concentrations of total coliform being as high as several orders of magnitude greater than the lowest applicable criterion. Local land-use characteristics will need to be identified before any definitive conclusions as to the cause of the elevated pathogen levels in the creek can be made. Release of recycled water into the creek will flush existing pathogens downstream and out of the creek. Continued release of recycled water into the creek may provide the dilution necessary to keep pathogen concentrations under control.

Metals - Maximum concentrations of metals at all stations were below the lowest applicable criteria for each metal. It is unknown at this time why the recycled water sample collected from the Reservoir Storage Tank contained five times as much mercury as was measured at the TPS site since they are from the same source.

Anions - The concentration of measured anions measured in the creek samples were consistent with those found in other creeks of the region. The concentration of anions in the recycled water was elevated with respect to background creek levels. Further study is needed to assess the impact that increased anions may have on the creek.

General Water Quality Parameters - Dissolved oxygen (DO) concentrations were greater than the lowest appropriate criterion of 5.0 mg/l at all sites along the creek and at all monitoring events, except at the Watson Park Upstream station.

Dissolved oxygen was measured on a continuous basis at three of the monitoring stations (Charcot, Kelley Park, and Singleton) in an effort to capture the diurnal variability of this parameter. The continuous data indicate that DO levels at the Kelley Park and Singleton monitoring stations dropped to levels slightly below the 5.0 mg/l limit and that the drops occurred in the pre-dawn to early morning hours of May.

Dissolved oxygen concentrations in the recycled water were comparable to those found in the creek but were not observed to fall below the 5.0 mg/l criterion. The single exception is the recycled water collected from the Reservoir Storage Tanks, which exhibited extremely low DO levels.

The pH range observed at all of the monitoring stations was within acceptable criterion limits of 6.5 – 8.5. However, the YSI continuous monitoring pH meter detected elevated pH values at the Singleton site during the early evening (3 - 8 pm) hours of May.

Chronic Toxicity Bioassays - Chronic toxicity bioassays using the waterflea, *Ceriodaphnia dubia* indicated that neither the creek samples nor the recycled water samples collected in June contained any lethal (survival) or sublethal (reproductive) toxicity.

SUMMARY

This study to determine the baseline water quality characteristics for Coyote Creek confirmed results obtained from the 1999 baseline monitoring study (Tetra Tech, Inc., 2000). Water quality in Coyote Creek was found to be degraded because of high temperatures, elevated mercury, and high pathogen levels. The current study found two primary areas (temperature and pathogens) of concern. Comparisons of the Coyote Creek water quality characteristics to those of the recycled water indicated that releasing recycled water into the creek would most likely reduce the concentrations of metals and pathogens. Cooling the recycled water prior to release will obviously reduce the temperature locally.

The nutrient concentrations in the recycled water, while elevated with respect to background nutrient concentrations, are not expected to affect algal and plant growth. This is because creek nutrient concentrations are already saturated and no nuisance algal blooms have been observed to occur as a result.

SECTION 1.0
INTRODUCTION

The City of San Jose's Environmental Enhancement Program includes streamflow augmentation and wetland creation using recycled water to help restore ecological health in the aquatic environment and to improve water management in the South San Francisco Bay region. The Coyote Creek Streamflow Augmentation Pilot Project is the first step in testing the feasibility of using recycled water for beneficial environmental uses in the South Bay. The pilot project is an experimental program that will determine if the release of recycled water into Coyote Creek during summer low-flow conditions can create and maintain stream conditions that enhance the aquatic environment and can support cold-water fish species.

Water quality data have been collected from Coyote Creek periodically for the last 29 years, with the primary sources of data being from three different sources (Santa Clara Valley Water District, City of San Jose/Santa Clara Water Pollution Control Plant, and the U.S. EPA STORET database) (Tetra Tech, Inc., 2000). These sources indicated that water quality in Coyote Creek has been quite degraded, and that there were three primary areas of concern (temperature, nutrients, and pathogens). Even though metals were found to be present, their effect was considered to be negligible due to the ambient hardness of creek water. Background water temperatures in the creek during the summer months were determined to be too warm to sustain a cold-water fishery. Ambient nutrient concentrations were also elevated, with both nitrogen and phosphorus alternating as the growth-limiting nutrient for algae. Measured concentrations of pathogens exceeded all applicable water quality criteria by two to three orders of magnitude.

The California Department of Fish and Game has identified the dry summer months as a critical period for salmonid species with respect to water temperature requirements (Raleigh, *et al.*, 1984, 1986; Rich 1987). This pilot project was designed to augment the flow to Coyote Creek during these critical months with cooled, recycled water.

An initial step for this pilot project is to establish the baseline water quality conditions in Coyote Creek. Baseline conditions provide a reference that can be used to assess the effects of releasing recycled water into the creek. Since this Pilot Project was conceived, monthly monitoring of water quality in Coyote Creek has been conducted four times between July and October 1999 *(Coyote Creek Water Quality Monitoring Report, July – October 1999.* Tetra Tech, April 2000) and seven times in 2000. The 2000 monitoring effort was designed to continue characterizing baseline water quality in Coyote Creek and to establish water quality conditions in two of its tributaries (Upper Penitencia and San Miguelita Creeks) during the low-flow months from May to November 2000. This report describes the results of the 2000 Coyote Creek baseline monitoring efforts.

Additionally, benthic macroinvertebrates and aquatic vegetation were also monitored during the same time period in 2000. These data are provided in separate reports and will not be discussed here.

This report is organized into seven sections:

- Section 1 provides background information about the rationale behind performing this baseline water quality study;
- Section 2 describes the monitoring sites along Coyote Creek;
- Section 3 provides a description of the methods used, the number of samples collected, and an evaluation of the YSI and HydroLab continuous reading multi-meters;
- Section 4 presents the results according to their general water quality class (metals, anions and nutrients, general water quality parameters, toxicity bioassay tests, pathogens, and continuous water quality measurements);
- Section 5 provides a discussion of the monitoring results, a comparison of the Coyote Creek water quality to existing applicable water quality criteria, and the potential effects of recycled water on creek water quality;
- Section 6 explains data quality issues. This section describes data anomalies that occurred during the testing period, possible explanations for their occurrence, and recommended corrective actions;
- Section 7 presents the conclusions and recommendations. This section provides an overall assessment of Coyote Creek water quality and the potential effects of releasing recycled water into the creek.

SECTION 2.0
STUDY AREA

Sampling locations are based on the results of the aquatic habitat survey conducted in November 1998 (Jones & Stokes, December 1998) and the 1999 baseline monitoring efforts (Tetra Tech, Inc., 2000). The experience gained from these initial monitoring efforts and review of the results has lead to changes in the location of some of the monitoring stations to ensure that an adequate number of stations are upstream and downstream of the proposed release point at the Singleton Road station. Additionally, sites in Upper Penitencia and San Miguelita Creeks were included in this monitoring effort in an attempt to characterize water quality from two primary sources to Coyote Creek (Figure 2-1). Overall, there were 12 monitoring locations; eight sites in Coyote Creek, two in tributaries to the creek, and two recycled water sources (Transfer Pump Station (TPS) and the Storage Reservoir Tank on Yerba Buena Road). The specific monitoring sites are listed below in downstream ⟶ upstream order:

Station	Latitude/Longitude (DD)
Charcot	37.3859/121.9096
Fleamarket/Muni Golf	37.3745/121.8896
Upper Penitencia Creek	37.3707/121.8714
Watson Park (downstream)	37.3575/121.8737
San Miguelita Creek	37.3561/121.8736
Watson Park (upstream)	37.3561/121.8740
Kelley Park	37.3221/121.8537
Stonegate	37.3085/121.8395
Singleton	37.2957/121.8209
Hellyer	37.2860/121.8124
TPS	37.4288/121.9400
Recycled Water Reservoir Tank	37.2932/121.7884

The Hellyer and Singleton sites are upstream of the proposed release site and will be used as control stations for this project.

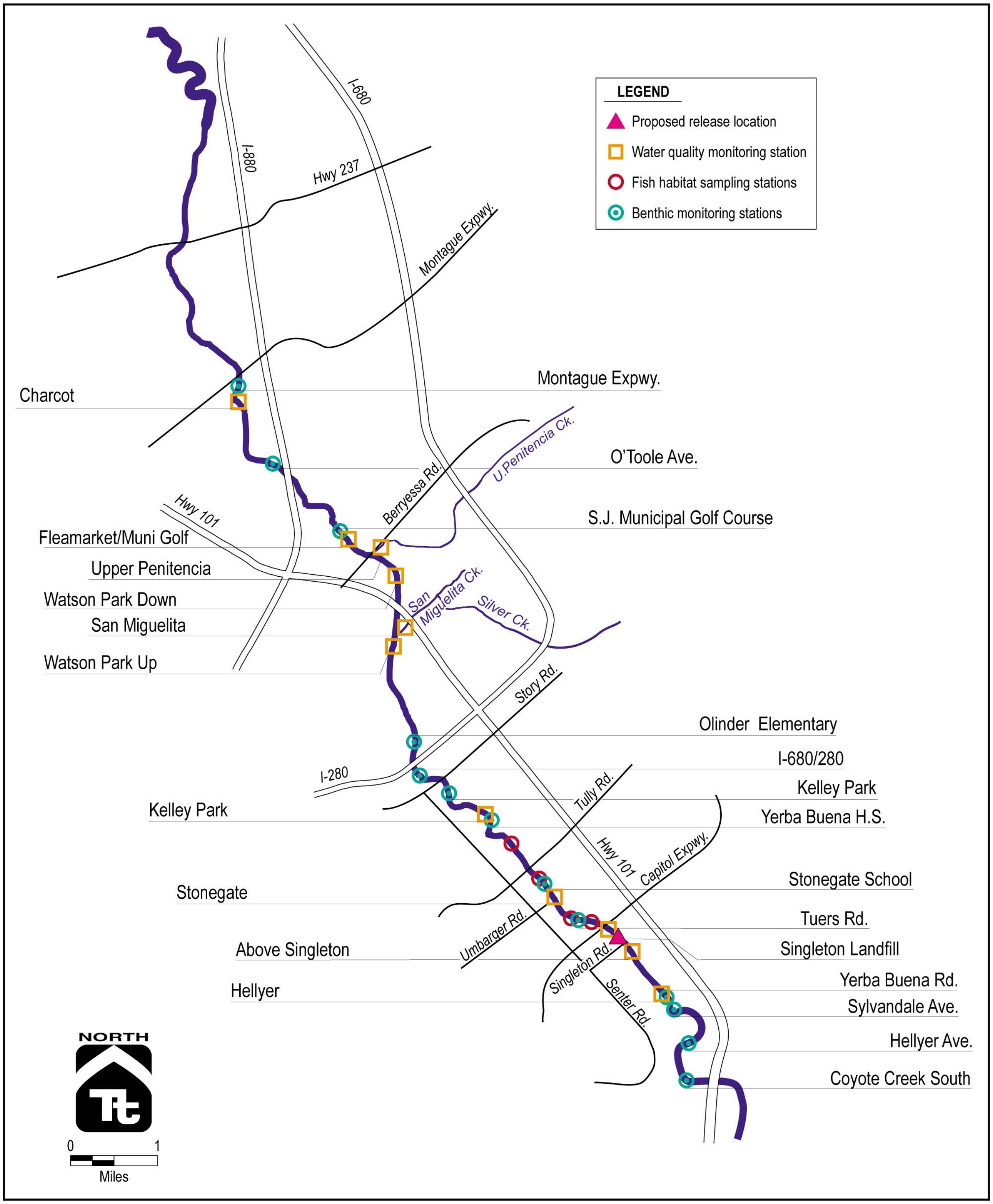

Figure 2-1. 2000 Coyote Creek monitoring stations.

SECTION 3.0
METHODS

A variety of sampling methods were used for the 2000 baseline monitoring efforts. These included handheld meters, grab samples, and YSI and HydroLab continuous recording multi-meters. The details of the specific methods can be located in the QAPP for this project entitled, *Quality Assurance Project Plan. Coyote Creek Monitoring Program for Surface Water Quality*. (Tetra Tech, April 2000).

Fifty-five water quality parameters were measured during each sampling event, but not at every monitoring station. *Giardia* and *Cryptosporidium* were measured only at Charcot, Singleton, and TPS. Organophosphorus pesticides (chlorpyrifos, diazinon, and malathion) were measured in July and only at the Charcot and Watson Park Downstream sites. Dissolved mercury and zinc were not measured at any of the sites at any time. YSI and HydroLab continuous multi-parameter meters were deployed on a "week on/week off" basis at Charcot, Kelley Park, and Singleton sites. YSI and HydroLab continuous meters were deployed in tandem at the Kelley Park and Singleton sites, with the Charcot site having only a YSI continuous meter. Continuous temperature plotters were deployed at Charcot, Hellyer, Kelley Park, Singleton, Penitencia, Watson Park Upstream, and TPS.

The water quality parameters measured, the analytical method used and the total number of grab samples collected are presented in Table 3-1.

Water quality samples were collected from each of the monitoring stations, except the Recycled Water Reservoir Tank, on seven separate sampling periods (May 02 - 03, June 06 - 07, July 11 - 12, August 01 - 02, September 12 - 13, October 03 - 04, and November 07 - 08 2000). The Recycled Water Reservoir Tank was sampled only during the September, October, and November monitoring events.

Table 3-1
Summary of Water Quality Parameters Measured

Parameter	Method	Total Number Samples
Metals:		
Arsenic	SM 3114C	172
Cadmium	EPA 213.2	172
Calcium	EPA 6010	66
Total Chromium	EPA 218.2	172
Copper	EPA 220.2	172
Lead	EPA 239.2	172
Magnesium	EPA 6010	66
Mercury	EPA 1631	82
Methyl Mercury	EPA 1630M Draft	11
Nickel	EPA 249.2	172
Selenium	SM 3114C	172
Silver	EPA 272.2	172
Sodium	EPA 6010	28
Zinc	EPA 200.7	86
Anions and Nutrients:		
Chloride	EPA 300	35
Sulfate	EPA 300	45
Phosphate-P	EPA 300	35
Ortho-Phosphate	EPA 300	67
Total Phosphorus	EPA 300	67
Nitrate-N	EPA 300	56
Ammonia-N	SM 4500 NH_3-F	78
Unionized Ammonia-N	Calculation	73
TOC	SM 5310B	79
DOC	SM 5310B	79
TSS	SM 2540D	68
TDS	SM 2540C	79
BOD(5)	SM 5210B	78

Table 3-1 (continued)
Summary of Water Quality Parameters Measured

Parameter	Method	Total Number Samples
General Water Quality Parameters:		
Temperature	Meter	78
pH	Meter	73
Dissolved Oxygen	Meter	66
Conductivity	SM 2510B	146
Turbidity	SM 2130B/Meter	59
Hardness	EPA 130.2	46
Alkalinity	EPA 310.1	24
Organophosphate Pesticides:		
Chlorpyrifos	EPA 3520	2
Diazinon	EPA 3520	2
Malathion	EPA 3520	2
Chronic Toxicity Bioassay:		
Ceriodaphnia dubia	EPA-600-4-91-002	4
Pathogens:		
Total Coliform	SM 9222B	67
Fecal Coliform	SM 9222D	67
Enterococcus	SM 9230C	67
Giardia	EPA 1623	27
Cryptosporidium	EPA 1623	23

Grab samples were collected by City of San Jose Environmental Services Department (City) and Tetra Tech staff into pre-cleaned and labeled sample bottles, stored in the dark in coolers containing frozen blue-ice, and transported under Chain of Custody via automobile to the City's laboratory on Zanker Road in San Jose. Once at the lab, the samples were logged in and processed for analysis.

Triplicate grab samples were collected for metals analysis from the Charcot, Kelley Park, and Singleton sites during the May sampling event. Analyzing triplicate samples provides data necessary to determine the variability of each measured parameter at a specific site.

Water quality analyses were performed by the City's laboratory. Chronic *Ceriodaphnia dubia* toxicity bioassays were performed by the City's laboratory on samples collected from the Charcot, Hellyer, Stonegate, and TPS sites during the June monitoring event. Methyl mercury concentrations were determined by Frontier Geo Sciences, Inc. (Seattle, WA). Low level (<1 mg/l) phosphate analyses were performed by ToxScan, Inc. (Watsonville, CA). Pathogen samples (*Giardia* and *Cryptosporidium*) collected between May and November were analyzed by Clancy Environmental Consultants, Inc. (St. Albans, VT), with splits being analyzed in October and November by both Clancy Environmental Consultants, Inc. and BioVir Laboratories, Inc. (Benicia, CA).

YSI and HydroLab continuous recording multi-meters were deployed on a “week on/week off” basis by City and Tetra Tech staff. These meters were calibrated at the City’s lab on Zanker Road prior to deployment and once again upon retrieval. The temperature loggers were calibrated prior to deployment and left in the field for the duration of the study. Monthly readings were taken from the temperature loggers on the same date that water quality samples were collected. It should be noted that the record is not absolutely complete since some of the temperature loggers were lost during the study.

3.1 YSI/HYDROLAB COMPARISON

YSI and HydroLab continuous multi-probe meters were deployed at the Charcot, Kelley Park, and Singleton sites. These meters are designed to take continuous readings and were used to assess the diurnal variability of dissolved oxygen, temperature, pH, and turbidity. Both brands of continuous meters are designed to perform essentially the same function (*i.e.,* continuously record basic water quality parameters) and should, in theory, produce the same results in a side-by-side study. However, this assumption had not been tested and before we decided upon using either one brand or both brands we needed to know how well they “agreed” with each other. This was achieved by placing them in tandem at two sites (Kelley Park and Singleton). The Charcot site used the YSI meter exclusively.

The deployment procedure called for the meters to be calibrated prior to deployment and then once again upon retrieval. These calibrations were performed at the City’s laboratory using standardized calibrating solutions for dissolved oxygen, pH, conductivity and turbidity. The reason for having both a pre-deployment and post retrieval calibration is to check for equipment drift. Ideally, if an instrument is functioning properly, the drift between calibrations should be minimal.

It became quite apparent after the first two deployments that the HydroLab meters consistently exhibited a greater level of drift than did the YSI meters with respect to the dissolved oxygen measurement (Figures 3-1 through 3-3). There was no indication that the other parameters being measured and recorded exhibited the same degree of drift.

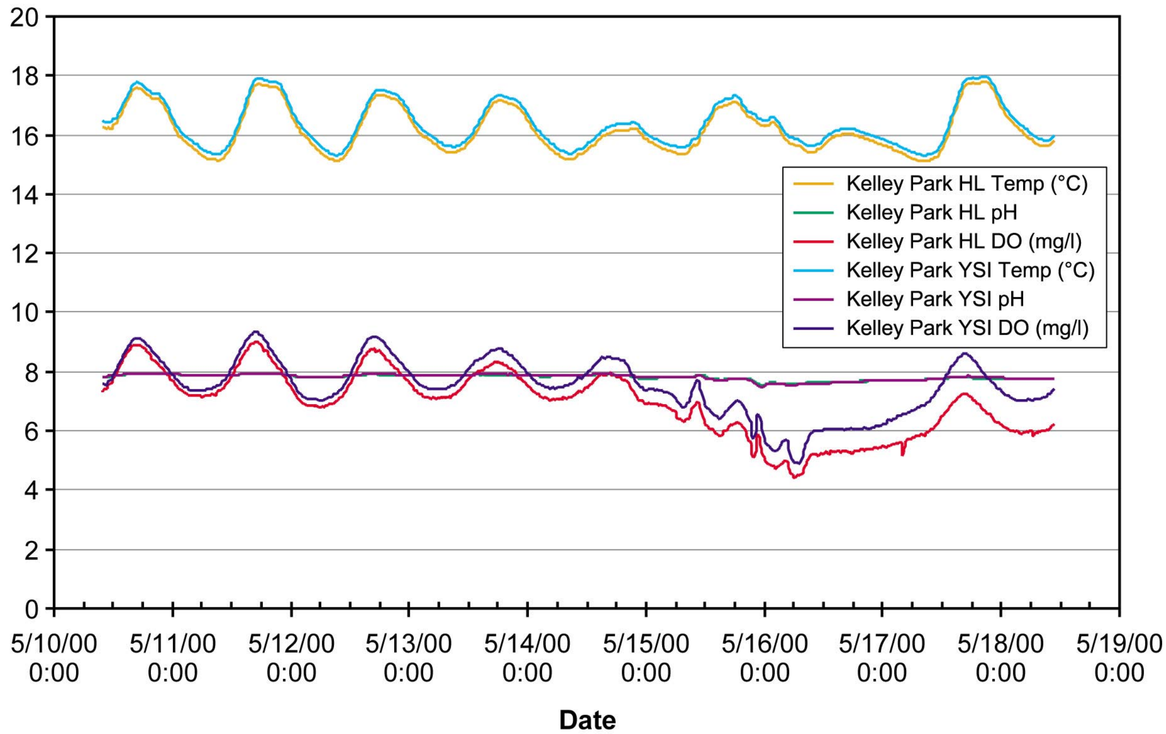

Figure 3-1. Kelley Park HydroLab/YSI comparison (5/10/00).

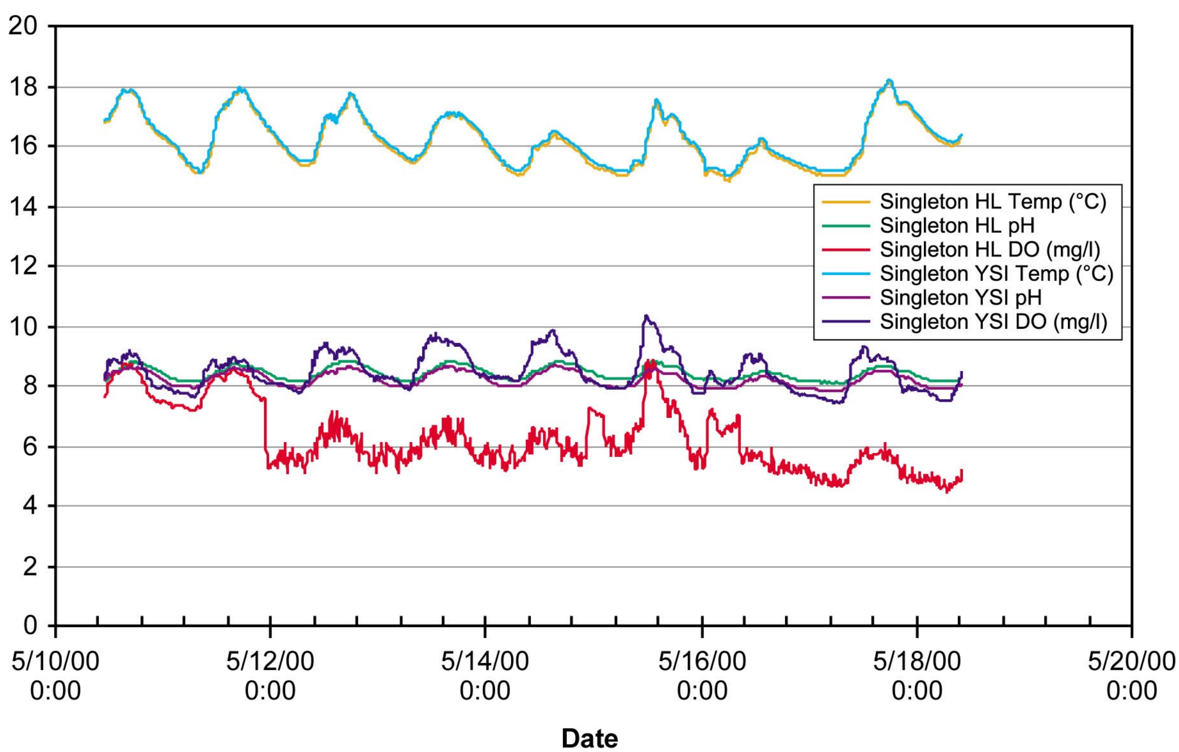

Figure 3-2. Singleton HydroLab/YSI comparisons (5/10/00).

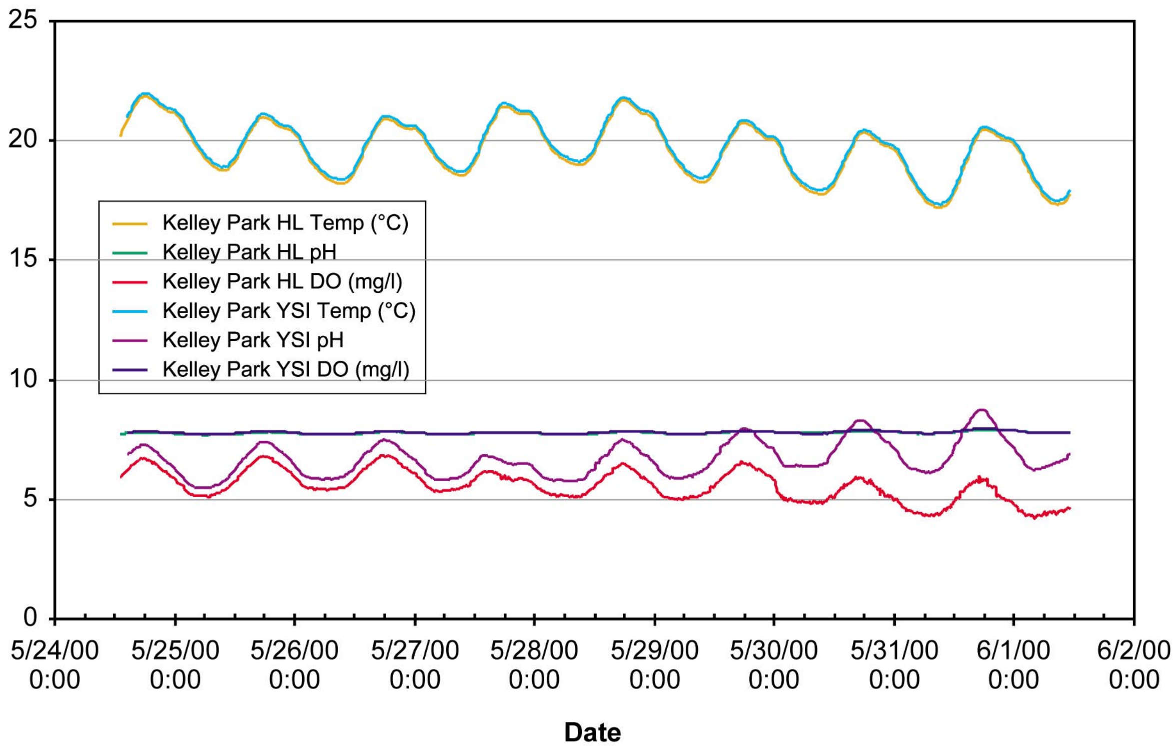

Figure 3-3. Kelley Park HydroLab/YSI comparisons (5/24/00).

Calibration logs indicated that the HydroLab meters generally produced post-retrieval measurements that were between 5 and 15% lower than the known calibration standard, while the YSI meters exhibited a much smaller range of difference (Table 3-2).

The cause of the HydroLab meter drift remains unknown at this time. However, one possibility is that the HydroLab dissolved oxygen measurements are dependent upon an electrical stirrer, which may have become fouled over the course of deployment. The YSI meters do not employ this same technology. The consistent drift observed in the HydroLab meters caused us to exclude them from the data analysis presented in this report. All diurnal data presented in this report were generated using the YSI meters.

Table 3-2
Summary Calibration Log for the 5/10/2000 and 5/24/2000
HydroLab/YSI Side-by-Side Study

	Dissolved Oxygen (% Difference from Post-Retrieval Standard)	
Station	**HydroLab**	**YSI**
5/10/00:		
Kelley Park	-14.9	-1.8
Singleton	-4.9	+0.8
5/24/00:		
Kelley Park	-12.3	+0.1
Singleton	-9.3	-1.5

SECTION 4.0
RESULTS

Water quality characteristics were measured for seven classes of constituents in Coyote Creek:

- Metals (total and dissolved);
- Anions and nutrients;
- General water quality parameters;
- Organophosphate pesticides;
- Chronic toxicity;
- Pathogens; and
- Continuous measurements (temperature, pH, and dissolved oxygen)

The results obtained for each of these constituent classes are presented in the following sections.

4.1 METALS

Total and dissolved metals concentrations were measured for the ten priority metals listed in the Water Quality Control Plan for the San Francisco Bay Region – Basin Plan 1995 (arsenic, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc). Additional metals analyzed were, methyl mercury (Charcot, Hellyer, and TPS sites) and sodium, calcium, and magnesium (all sites).

The arithmetic mean, range, and the number of samples of each of these metals are presented in the Appendix to this report. The results for each monitoring site are presented below.

4.1.1 Charcot

Total Metals – 94 percent of the measured samples contained quantifiable concentrations of all ten priority metals as well as methyl mercury, sodium, calcium, magnesium, and total hardness (Table 4-1).

Dissolved Metals – 54 percent of the measured samples contained quantifiable concentrations of seven of the priority metals (arsenic, cadmium, total chromium, copper, nickel, selenium, and silver). Concentrations of dissolved lead were below the detection limit of 0.5 µg/l for every sample analyzed. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-1).

Table 4-1
Mean and Range of Metal Concentrations Present at the Charcot Monitoring Station

	Mean Concentration (Range) (µg/l)	
Metal	**Total**	**Dissolved**
Arsenic	2.4 (2.2 – 2.6)	2.2 (1.9 – 2.3)
Cadmium	0.2 (0.1 – 0.2)	0.1 (0.1 – 0.2)
Chromium	2.9 (1.6 – 6.5)	0.7 (0.6 – 0.8)
Copper	3.4 (2.2 - 5.2)	1.6 (0.9 – 2.2)
Lead	1.6 (1.2 – 2.0)	<0.5
Mercury	0.005 (0.004 – 0.007)	Na
Methyl Mercury (ng/l)	0.15 (0.07 – 0.23)	Na
Nickel	5.1 (3.7 – 6.7)	1.9 (0.9 – 3.7)
Selenium	1.9 (1.5 – 2.1)	1.9 (1.3 – 2.4)
Silver	0.6 (0.2 – 1.0)	0.1
Zinc	13 (9 – 29)	Na
Sodium	111	Na
Calcium	61 (55 – 66)	59
Magnesium	53 (48 – 55)	53
Total Hardness (mg $CaCO_3$/l)	369 (334 – 386)	Na

4.1.2 Fleamarket/Muni Golf

Total Metals – 83 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-2). Cadmium concentrations were below the detection limits of 0.1, 0.2 and 0.5 µg/l one, four, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-2).

Dissolved Metals – 52 percent of the measured samples contained quantifiable concentrations of five of the priority metals (arsenic, cadmium, copper, nickel, and selenium). Concentrations of dissolved lead and chromium were below the detection limits of 0.5 µg/l for every sample analyzed. Dissolved silver concentrations were below the detection limits of 0.05, 0.1, and 1.0 µg/l four, one, and two times, respectively. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-2).

Table 4-2
Mean and Range of Metal Concentrations Present at the Fleamarket/Muni Golf Monitoring Station

Metal	Mean Concentration (Range) (µg/l)	
	Total	Dissolved
Arsenic	2.5 (2.4 – 2.6)	2.1 (1.9 – 2.5)
Cadmium	(<0.1 – <0.5)	0.1
Chromium	2.7 (2.0 – 5.1)	<0.5
Copper	3.4 (2.5 – 5.1)	1.9 (1.5 – 2.3)
Lead	1.7 (1.2 – 2.0)	<0.5
Mercury	0.006 (0.005 – 0.007)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	4.6 (2.8 – 6.0)	2.0 (0.9 – 3.2)
Selenium	1.9 (1.5 – 2.2)	1.7 (1.4 – 2.1)
Silver	(<0.05 – <1.0)	(<0.05 – <1.0)
Zinc	15 (8 – 28)	Na
Sodium	112	Na
Calcium	61 (59 – 64)	57
Magnesium	53 (51 – 56)	51
Total Hardness (mg $CaCO_3$/l)	370 (357 – 380)	Na

4.1.3 Upper Penitencia Creek

Total Metals – 64 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-3). Cadmium concentrations were below the detection limits of 0.1, 0.2 and 0.5 µg/l one, four, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-3).

Dissolved Metals – 52 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, cadmium, copper, nickel, selenium, and silver). Concentrations of dissolved lead and chromium were below the detection limits of 0.5 µg/l for every sample analyzed. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-3).

Table 4-3
Mean and Range of Metal Concentrations Present at the Upper Penitencia Creek Monitoring Station

	Mean Concentration (Range) (µg/l)	
Metal	**Total**	**Dissolved**
Arsenic	1.8 (1.4 – 2.0)	1.7 (1.4 – 1.9)
Cadmium	(<0.1 – <0.5)	(<0.1 – <0.5)
Chromium	1.2 (0.9 – 1.7)	<0.5
Copper	5.1 (2.9 – 7.1)	3.2 (1.5 – 4.7)
Lead	0.7	<0.5
Mercury	0.003 (0.002 – 0.004)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	2.4 (1.1 – 4.8)	1.2 (0.8 – 1.9)
Selenium	0.2 (0.1 – 0.4)	0.2 (0.1 – 0.4)
Silver	(<0.05 – <1.0)	0.1
Zinc	10 (5 – 20)	Na
Sodium	56	Na
Calcium	19 (14 – 24)	17
Magnesium	14 (10 – 18)	13
Total Hardness (mg $CaCO_3$/l)	103 (75 – 132)	Na

4.1.4 Watson Park Downstream

Total Metals – 82 percent of the measured samples contained quantifiable concentrations of nine of the priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-4). Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-4).

Dissolved Metals – 50 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, cadmium, copper, nickel, selenium, and silver). Concentrations of dissolved lead and chromium were below the detection limits of 0.5 µg/l for every sample analyzed. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-4).

Table 4-4
Mean and Range of Metal Concentrations Present at the Watson Park Downstream Monitoring Station

	Mean Concentration (Range) (µg/l)	
Metal	**Total**	**Dissolved**
Arsenic	2.4 (2.2 – 2.6)	2.1 (1.8 – 2.4)
Cadmium	0.2	0.1
Chromium	2.9 (2.1 – 3.8)	<0.5
Copper	2.8 (1.7 – 3.8)	1.3 (1.0 – 1.6)
Lead	2.4 (1.5 – 3.3)	<0.5
Mercury	0.007 (0.005 – 0.010)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	5.2 (3.9 – 6.0)	2.0 (0.9 – 3.8)
Selenium	2.4 (1.8 – 2.8)	2.4 (1.8 – 3.0)
Silver	(<0.05 – <1.0)	0.1
Zinc	18 (10 – 43)	Na
Sodium	127	Na
Calcium	65 (51 – 72)	70
Magnesium	56 (44 – 61)	64
Total Hardness (mg $CaCO_3$/l)	394 (309 – 430)	Na

4.1.5 San Miguelita Creek

Total Metals – 82 percent of the measured samples contained quantifiable concentrations of nine of the priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-5). Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-5).

Dissolved Metals – 53 percent of the measured samples contained quantifiable concentrations of seven of the priority metals (arsenic, cadmium, chromium, copper, nickel, selenium, and silver). Concentrations of dissolved lead were below the detection limit of 0.5 µg/l for every sample analyzed. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-5).

Table 4-5
Mean and Range of Metal Concentrations Present at the San Miguelita Creek Monitoring Station

Metal	Mean Concentration (Range) (µg/l)	
	Total	Dissolved
Arsenic	2.3 (0.6 – 2.8)	1.9 (0.5 – 2.5)
Cadmium	0.2 (0.1 – 0.2)	0.1
Chromium	2.9 (1.6 – 4.6)	0.5
Copper	2.9 (2.1 – 3.9)	1.4 (1.0 – 1.9)
Lead	2.2 (1.0 – 3.0)	<0.5
Mercury	0.007 (0.003 – 0.014)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	3.7 (2.5 – 5.3)	1.8 (1.1 – 3.2)
Selenium	2.8 (2.6 – 3.1)	2.7 (2.0 – 3.2)
Silver	(<0.05 – <1.0)	0.1
Zinc	17 (10 – 33)	Na
Sodium	179	Na
Calcium	88 (85 – 91)	84
Magnesium	68 (66 – 71)	69
Total Hardness (mg $CaCO_3$/l)	498 (482 – 520)	Na

4.1.6 Watson Park Upstream

Total Metals – 82 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-6). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l one, four, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-6).

Dissolved Metals – 53 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, chromium, copper, nickel, selenium, and silver). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l four, two, and one times, respectively. Concentrations of dissolved lead were below the detection limit of 0.5 µg/l for every sample analyzed. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-6).

Table 4-6
Mean and Range of Metal Concentrations Present at the Watson Park Upstream Monitoring Station

Metal	Mean Concentration (Range) (µg/l) Total	Dissolved
Arsenic	2.4 (1.9 – 3.0)	2.1 (1.6 – 2.5)
Cadmium	(<0.1 – <0.5)	(<0.1 – <0.5)
Chromium	3.0 (1.9 – 5.6)	1.4
Copper	2.5 (1.9 – 3.0)	1.1 (0.7 – 1.6)
Lead	2.9 (2.0 – 5.0)	<0.5
Mercury	0.010 (0.007 – 0.015)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	7.0 (3.9 –11.0)	2.5 (0.8 – 4.8)
Selenium	2.0 (0.2 – 2.7)	2.3 (1.5 – 2.6)
Silver	(<0.05 – <1.0)	0.1
Zinc	13 (7 – 27)	Na
Sodium	71	Na
Calcium	53 (51 – 56)	52
Magnesium	55 (52 – 58)	58
Total Hardness (mg $CaCO_3$/l)	358 (343 – 380)	Na

4.1.7 Kelley Park

Total Metals – 82 percent of the measured samples contained quantifiable concentrations of nine of the priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-7). Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, two, and six times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-7).

Dissolved Metals – 59 percent of the measured samples contained quantifiable concentrations of seven of the priority metals (arsenic, cadmium, chromium, copper, nickel, selenium, and silver) as well as sodium, calcium, and magnesium. Concentrations of dissolved lead were below the detection limits of 0.5 µg/l eight times and below 1.0 µg/l once. Dissolved mercury, methyl mercury, zinc and sodium were not analyzed at this monitoring station (Table 4-7).

Table 4-7
Mean and Range of Metal Concentrations Present at the Kelley Park Monitoring Station

	Mean Concentration (Range) (µg/l)	
Metal	**Total**	**Dissolved**
Arsenic	2.5 (1.8 – 3.0)	2.1 (1.5 – 2.6)
Cadmium	0.4 (0.2 – 0.5)	0.2
Chromium	4.5 (3.1 – 5.5)	0.7 (0.6 – 0.9)
Copper	3.3 (2.5 – 4.1)	1.3 (0.9 – 1.6)
Lead	2.1 (0.7 – 3.0)	(<0.5 - <1.0)
Mercury	0.009 (0.004 – 0.012)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	8.6 (3.6 –10.5)	2.8 (1.0 – 4.5)
Selenium	1.1 (0.8 – 1.4)	1.1 (0.6 – 1.4)
Silver	(<0.05 – <1.0)	0.1
Zinc	12 (6 – 14)	Na
Sodium	48 (45 – 50)	48
Calcium	42 (40 – 43)	41
Magnesium	39 (38 – 40)	38
Total Hardness (mg $CaCO_3$/l)	269 (262 – 283)	Na

4.1.8 Stonegate

Total Metals – 78 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-8). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l one, four, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-8).

Dissolved Metals – 56 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, chromium, copper, nickel, selenium, and silver) as well as sodium, calcium, and magnesium. Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5µg/l one, four, and two times, respectively. Concentrations of dissolved lead were below the detection limits of 0.5 µg/l six times and below 1.0 µg/l once. Dissolved mercury, methyl mercury, and zinc were not analyzed at this monitoring station (Table 4-8).

Table 4-8
Mean and Range of Metal Concentrations Present at the Stonegate Monitoring Station

Metal	Mean Concentration (Range) (µg/l)	
	Total	Dissolved
Arsenic	2.2 (1.6 – 3.1)	2.0 (1.4 – 2.8)
Cadmium	(<0.1 - <0.5)	(<0.1 - <0.5)
Chromium	3.9 (1.8 – 5.5)	0.8 (0.6 – 0.9)
Copper	2.7 (1.8 – 3.6)	1.1 (1.0 – 1.4)
Lead	1.7 (0.7 – 3.0)	(<0.5 - <1.0)
Mercury	0.007 (0.004 – 0.011)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	9.0 (4.7 –12.1)	2.5 (1.7 – 3.7)
Selenium	0.3 (0.2 – 0.4)	0.3 (0.2 – 0.4)
Silver	(<0.05 – <1.0)	0.1
Zinc	10 (8 – 12)	Na
Sodium	32 (30 – 33)	31
Calcium	38 (35 – 41)	37
Magnesium	31 (29 – 32)	30
Total Hardness (mg $CaCO_3$/l)	222 (209 – 234)	Na

4.1.9 Singleton

Total Metals – 73 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-9). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l one, six, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, five, and three times, respectively. Methyl mercury was not analyzed at this monitoring station (Table 4-9).

Dissolved Metals – 56 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, chromium, copper, nickel, selenium, and silver) as well as sodium, calcium, and magnesium. Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5µg/l six, two, and one times, respectively. Concentrations of dissolved lead were below the detection limits of 0.5 µg/l eight times and below 1.0 µg/l once. Dissolved mercury, methyl mercury, and zinc were not analyzed at this monitoring station (Table 4-9).

Table 4-9
Mean and Range of Metal Concentrations Present at the Singleton Monitoring Station

Metal	Mean Concentration (Range) (µg/l)	
	Total	Dissolved
Arsenic	2.5 (1.0 – 4.3)	2.1 (0.9 – 2.7)
Cadmium	(<0.1 - <0.5)	(<0.1 - <0.5)
Chromium	3.8 (1.3 – 6.3)	0.9 (0.8 – 1.0)
Copper	2.5 (1.2 – 3.9)	1.3 (0.8 – 1.9)
Lead	1.1 (0.8 – 2.0)	(<0.5 - <1.0)
Mercury	0.007 (0.003 – 0.009)	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	7.8 (3.7 –11.0)	2.5 (1.1 – 3.7)
Selenium	0.3 (0.2 – 0.3)	0.2 (0.2 – 0.3)
Silver	(<0.05 – <1.0)	0.1
Zinc	14 (8 – 21)	Na
Sodium	32 (26 – 36)	33
Calcium	38 (36 – 41)	35
Magnesium	31 (28 – 34)	31
Total Hardness (mg $CaCO_3$/l)	222 (216 – 230)	Na

4.1.10 Hellyer

Total Metals – 66 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as methyl mercury, sodium, calcium, magnesium, and total hardness (Table 4-10). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l one, four, and three times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, three, and four times, respectively (Table 4-10).

Dissolved Metals – 50 percent of the measured samples contained quantifiable concentrations of six of the priority metals (arsenic, chromium, copper, nickel, selenium, and silver) as well as sodium, calcium, and magnesium. Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5µg/l five, two, and one times, respectively. Concentrations of dissolved lead were below the detection limit of 0.5 µg/l at all times. Dissolved mercury, methyl mercury, and zinc were not analyzed at this monitoring station (Table 4-10).

Table 4-10
Mean and Range of Metal Concentrations Present at the Hellyer Monitoring Station

Metal	Mean Concentration (Range) (µg/l)	
	Total	Dissolved
Arsenic	1.5 (1.0 – 1.7)	1.2 (0.9 – 1.4)
Cadmium	(<0.1 - <0.5)	(<0.1 - <0.5)
Chromium	2.1 (0.7 – 3.6)	0.5
Copper	1.9 (1.3 – 3.0)	1.1 (1.0 – 1.3)
Lead	0.9 (0.6 – 1.0)	<0.5
Mercury	0.007 (0.004 – 0.009)	Na
Methyl Mercury (ng/l)	0.109 (0.045 – 0.230)	Na
Nickel	6.2 (5.0 –9.4)	2.0 (1.0 – 3.2)
Selenium	0.2 (0.2 – 0.3)	0.2 (0.1 – 0.2)
Silver	(<0.05 – <1.0)	0.1
Zinc	52	Na
Sodium	27 (26 – 28)	26
Calcium	39 (36 – 45)	36
Magnesium	28 (27 – 29)	26
Total Hardness (mg $CaCO_3$/l)	212 (204 – 231)	Na

4.1.11 TPS

Total Metals – 72 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as methyl mercury, sodium, calcium, magnesium, and total hardness (Table 4-11). Concentrations of cadmium were below the detection limits of 0.1, 0.2, and 0.5 µg/l one, three, and two times, respectively. Concentrations of silver were below the detection limits of 0.05, 0.1, and 1.0 µg/l one, two, and three times, respectively (Table 4-11).

Dissolved Metals – 67 percent of the measured samples contained quantifiable concentrations of eight of the priority metals (arsenic, cadmium, chromium, copper, lead, nickel, selenium, and silver) as well as sodium, calcium, and magnesium. Dissolved mercury, methyl mercury, and zinc were not analyzed at this monitoring station (Table 4-11).

Table 4-11
Mean and Range of Metal Concentrations Present at the TPS Monitoring Station

Metal	Mean Concentration (Range) (µg/l) Total	Dissolved
Arsenic	0.8 (0.6 – 1.1)	0.8 (0.5 – 1.0)
Cadmium	(<0.1 - <0.5)	0.2
Chromium	0.9 (0.5 – 1.5)	0.9 (0.6 – 1.3)
Copper	4.3 (2.6 – 6.0)	3.2 (0.8 – 4.8)
Lead	0.8 (0.6 – 1.0)	0.5 (0.5 – 0.6)
Mercury	0.002	Na
Methyl Mercury (ng/l)	0.049	Na
Nickel	7.5 (6.7 –8.3)	6.4 (1.1 – 9.0)
Selenium	0.5 (0.5 – 0.6)	0.5 (0.3 – 0.6)
Silver	(<0.05 – <1.0)	0.1
Zinc	61 (42 – 88)	Na
Sodium	169 (163 – 178)	161
Calcium	47 (46 – 48)	44
Magnesium	28 (27 – 30)	26
Total Hardness (mg $CaCO_3$/l)	234 (226 – 244)	Na

4.1.12 Reservoir Storage Tank

Total Metals – 78 percent of the measured samples contained quantifiable concentrations of nine of the priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc) as well as sodium, calcium, magnesium, and total hardness (Table 4-12). Concentrations of silver were below the detection limits of 0.2 µg/l once and 1.0 µg/l twice (Table 4-12).

Dissolved Metals – 78 percent of the measured samples contained quantifiable concentrations of seven of the priority metals (arsenic, cadmium, chromium, copper, lead, nickel, and selenium). Dissolved silver concentrations were below the detection limits of 0.1 µg/l once and 1.0 µg/l twice. Dissolved mercury, methyl mercury, zinc, sodium, calcium, and magnesium were not analyzed at this monitoring station (Table 4-12).

Table 4-12
Mean and Range of Metal Concentrations Present at the Reservoir Storage Tank Monitoring Station

Metal	Mean Concentration (Range) (μg/l) Total	Dissolved
Arsenic	0.9 (0.7 – 1.0)	0.8 (0.6 – 0.9)
Cadmium	4.5 (3.0 – 5.9)	4.1 (2.6 – 5.2)
Chromium	0.7	0.6
Copper	4.4 (3.6 – 4.9)	3.8 (3.6 – 4.0)
Lead	1.4 (0.9 – 2.0)	0.6
Mercury	0.003	Na
Methyl Mercury (ng/l)	Na	Na
Nickel	7.6 (5.6 – 9.3)	7.5 (5.6 – 8.8)
Selenium	0.5 (0.5 – 0.6)	0.5 (0.4 – 0.5)
Silver	(<0.2 – <1.0)	(<0.1 - <1.0)
Zinc	55 (46 – 67)	Na
Sodium	161 (159 – 163)	Na
Calcium	53 (50 – 56)	Na
Magnesium	28 (27 – 29)	Na
Total Hardness (mg $CaCO_3$/l)	248 (236 – 260)	Na

4.2 ANIONS AND NUTRIENTS

Thirteen anionic and nutrient water quality parameters were measured at each of the monitoring sites. These analytes included total suspended solids (TSS), total dissolved solids (TDS), dissolved organic carbon (DOC), total organic carbon (TOC), biochemical oxygen demand (BOD), ammonia-N, unionized ammonia-N, chloride, phosphate-P, ortho-phosphate, total phosphorus, nitrate-N, and sulfate.

Since detection limits for ammonia-N are mixed, ranging from <0.1 to <1.0 mg/l, and ammonia is classified as a toxicant as well as nutrient, all unionized ammonia values are calculated using the ammonia-N detection limit as the actual concentration. This provides a conservative estimate of the concentration of unionized ammonia in the test sample.

The arithmetic mean, range, and the number of samples of each of these metals are presented in the Appendix to this report. The results for each monitoring site are presented below.

4.2.1 Charcot

82 percent of the measured samples contained quantifiable concentrations of all thirteen anionic and nutrient analytes (Table 4-13).

Table 4-13
Mean and Range of Anionic and Nutrient Concentrations Present at the Charcot Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	27 (14 – 35)
TDS	694 (600 – 850)
DOC	2.9 (2.5 – 3.6)
TOC	3.5 (2.8 – 4.2)
BOD	4
Ammonia-N	0.3 (<0.1 - <1.0)
Unionized ammonia-N	0.009 (0.001 – 0.039)
Chloride	87 (77 – 106)
Phosphate-P	1.5
Ortho-phosphate	0.09 (0.05 – 0.11)
Total phosphorus	0.19 (0.08 – 0.49)
Nitrate-N	3.0 (2.5 – 3.8)
Sulfate	117 (93 – 149)

4.2.2 Fleamarket/Muni Golf

81 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-14).

Table 4-14
Mean and Range of Anionic and Nutrient Concentrations Present at the Fleamarket/Muni Golf Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	22 (18 – 32)
TDS	683 (550 – 840)
DOC	3.1 (2.8 – 4.1)
TOC	3.6 (3.0 – 4.5)
BOD	5
Ammonia-N	0.3 (<0.1 – <1.0)
Unionized ammonia-N	0.008 (0.001 – 0.032)
Chloride	88 (80 – 105)
Phosphate-P	<1.0
Ortho-phosphate	0.09 (0.05 – 0.11)
Total phosphorus	0.15 (0.10 – 0.18)
Nitrate-N	3.0 (2.3 – 3.8)
Sulfate	111 (92 – 146)

4.2.3 Upper Penitencia Creek

75 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-15).

Table 4-15
Mean and Range of Anionic and Nutrient Concentrations Present at the Upper Penitencia Creek Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	12 (5 – 22)
TDS	267 (150 – 450)
DOC	3.0 (2.4 – 3.6)
TOC	3.4 (2.7 – 4.5)
BOD	3
Ammonia-N	0.3 (<0.1 – <1.0)
Unionized ammonia-N	0.012 (0.001 – 0.06)
Chloride	47 (40 – 59)
Phosphate-P	<1.0
Ortho-phosphate	0.05 (0.01 – 0.08)
Total phosphorus	0.10 (0.05 – 0.17)
Nitrate-N	0.2 (0.05 – 0.35)
Sulfate	52 (25 – 115)

4.2.4 Watson Park Downstream

80 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-16).

Table 4-16
Mean and Range of Anionic and Nutrient Concentrations Present at the Watson Park Downstream Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	31 (16 – 42)
TDS	799 (660 – 900)
DOC	3.2 (2.8 – 3.9)
TOC	3.7 (3.0 – 4.5)
BOD	4
Ammonia-N	0.3 (<0.1 – <1.0)
Unionized ammonia-N	0.007 (0.0005 – 0.04)
Chloride	91 (76 – 114)
Phosphate-P	<1.0
Ortho-phosphate	0.10 (0.05 – 0.14)
Total phosphorus	0.22 (0.11 – 0.39)
Nitrate-N	3.8 (3.1 – 4.4)
Sulfate	126 (102 – 149)

4.2.5 San Miguelita Creek

80 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-17).

Table 4-17
Mean and Range of Anionic and Nutrient Concentrations Present at the San Miguelita Creek Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	37 (8 – 59)
TDS	1009 (860 – 1100)
DOC	2.6 (2.1 – 3.6)
TOC	3.9 (2.2 – 9.3)
BOD	6
Ammonia-N	0.3 (<0.1 – <1.0)
Unionized ammonia-N	0.011 (0.001 – 0.05)
Chloride	137 (127 – 152)
Phosphate-P	<1.0
Ortho-phosphate	0.10 (0.05 – 0.15)
Total phosphorus	0.15 (0.09 – 0.22)
Nitrate-N	6.6 (6.4 – 6.8)
Sulfate	174 (159 – 193)

4.2.6 Watson Park Upstream

83 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-18).

Table 4-18
Mean and Range of Anionic and Nutrient Concentrations Present at the Watson Park Upstream Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	17 (13 – 22)
TDS	597 (540 – 690)
DOC	3.7 (3.2 – 4.5)
TOC	4.5 (3.8 – 5.9)
BOD	3 (2 – 4)
Ammonia-N	0.2 (<0.1 – <1.0)
Unionized ammonia-N	0.004 (0.0002 – 0.02)
Chloride	59 (45 – 73)
Phosphate-P	<1.0
Ortho-phosphate	0.11 (0.05 – 0.13)
Total phosphorus	0.28 (0.13 – 0.62)
Nitrate-N	1.4 (1.1 – 2.0)
Sulfate	91 (75 – 103)

4.2.7 Kelley Park

79 percent of the measured samples contained quantifiable concentrations of eleven of the thirteen anionic and nutrient analytes. Ammonia-N was not detected at 0.1 mg/l in six of the measurements or at 1.0 mg/l in one of the measurements. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-19).

Table 4-19
Mean and Range of Anionic and Nutrient Concentrations Present at the Kelley Park Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	22 (9 – 28)
TDS	459 (400 – 530)
DOC	3.5 (3.2 – 4.1)
TOC	4.2 (3.1 – 5.8)
BOD	2
Ammonia-N	(<0.1 – <1.0)
Unionized ammonia-N	0.005 (0.0003 – 0.02)
Chloride	43 (33 – 61)
Phosphate-P	<1.0
Ortho-phosphate	0.05 (0.03 – 0.07)
Total phosphorus	0.14 (0.08 – 0.24)
Nitrate-N	1.0 (0.5 – 1.4)
Sulfate	58 (44 – 74)

4.2.8 Stonegate

80 percent of the measured samples contained quantifiable concentrations of eleven of the thirteen anionic and nutrient analytes. Ammonia-N was not detected at 0.1 mg/l in six of the measurements or at 1.0 mg/l in one of the measurements. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-20).

Table 4-20
Mean and Range of Anionic and Nutrient Concentrations Present at the Stonegate Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	25 (10 – 35)
TDS	349 (300 – 400)
DOC	3.3 (2.8 – 4.0)
TOC	4.8 (3.5 – 10.6)
BOD	2
Ammonia-N	(<0.1 – <1.0)
Unionized ammonia-N	0.008 (0.0003 – 0.04)
Chloride	32 (23 – 46)
Phosphate-P	<1.0
Ortho-phosphate	0.03 (0.02 – 0.05)
Total phosphorus	0.11 (0.03 – 0.20)
Nitrate-N	0.8 (0.6 – 1.1)
Sulfate	43 (39 – 47)

4.2.9 Singleton

77 percent of the measured samples contained quantifiable concentrations of eleven of the thirteen anionic and nutrient analytes. Ammonia-N was not detected at 0.1 mg/l in six of the measurements or at 1.0 mg/l in one of the measurements. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-21).

Table 4-21
Mean and Range of Anionic and Nutrient Concentrations Present at the Singleton Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	16 (7 – 23)
TDS	346 (300 – 400)
DOC	3.3 (2.6 – 3.9)
TOC	3.5 (2.9 – 4.1)
BOD	3
Ammonia-N	(<0.1 – <1.0)
Unionized ammonia-N	0.010 (0.0003 – 0.04)
Chloride	31 (20 – 45)
Phosphate-P	<1.0
Ortho-phosphate	0.02 (0.02 – 0.04)
Total phosphorus	0.08 (0.02 – 0.15)
Nitrate-N	2.1 (0.5 – 7.0)
Sulfate	55 (43 – 86)

4.2.10 Hellyer

75 percent of the measured samples contained quantifiable concentrations of eleven of the thirteen anionic and nutrient analytes. Ammonia-N was not detected at 0.1 mg/l in six of the measurements or at 1.0 mg/l in one of the measurements. Phosphate concentrations were always below the detection limit of 1.0 mg/l (Table 4-22).

Table 4-22
Mean and Range of Anionic and Nutrient Concentrations Present at the Hellyer Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	15 (5 – 22)
TDS	313 (280 – 340)
DOC	2.9 (2.5 – 3.3)
TOC	3.4 (2.7 – 4.1)
BOD	3 (2 – 3)
Ammonia-N	(<0.1 – <1.0)
Unionized ammonia-N	0.010 (0.0003 – 0.05)
Chloride	25 (20 – 34)
Phosphate-P	<1.0
Ortho-phosphate	0.01 (0.01 – 0.02)
Total phosphorus	0.08 (0.02 – 0.21)
Nitrate-N	2.2 (0.8 – 6.6)
Sulfate	54 (42 – 82)

4.2.11 TPS

79 percent of the measured samples contained quantifiable concentrations of twelve of the thirteen anionic and nutrient analytes. The TSS concentration was below the detection limit of 2.0 mg/l for all samples (Table 4-23).

Table 4-23
Mean and Range of Anionic and Nutrient Concentrations Present at the TPS Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	<2
TDS	763 (730 – 780)
DOC	8.4 (6.9 – 9.8)
TOC	8.9 (7.3 – 9.8)
BOD	7 (5 – 9)
Ammonia-N	0.7 (0.2 – 1.2)
Unionized ammonia-N	0.003 (0.0002 – 0.006)
Chloride	199 (193 – 202)
Phosphate-P	2.4 (1.5 – 3.9)
Ortho-phosphate	0.61 (0.30 – 1.10)
Total phosphorus	0.93 (0.57 – 1.40)
Nitrate-N	10.6 (8.5 – 12.7)
Sulfate	120 (110 – 135)

4.2.12 Storage Reservoir Tank

81 percent of the measured samples contained quantifiable concentrations of all thirteen anionic and nutrient analytes (Table 4-24).

Table 4-24
Mean and Range of Anionic and Nutrient Concentrations Present at the Storage Reservoir Tank Monitoring Station

Parameter	Mean and (Range) (mg/l)
TSS	2
TDS	760
DOC	7.5 (6.9 – 8.1)
TOC	8.2 (7.1 – 9.7)
BOD	2
Ammonia-N	0.2
Unionized ammonia-N	0.001
Chloride	182 (174 – 190)
Phosphate-P	4.3
Ortho-phosphate	1.12 (0.73 – 1.50)
Total phosphorus	1.40 (1.00 – 1.80)
Nitrate-N	10.2 (9.9 – 10.4)
Sulfate	111 (110 – 112)

4.3 GENERAL WATER QUALITY PARAMETERS

Six general water quality parameters were measured at each site. These parameters were turbidity, temperature, dissolved oxygen, pH, conductivity, and alkalinity.

The arithmetic mean, range, and the number of samples of each of these parameters are presented in the Appendix to this report. The results for each monitoring site are presented below.

4.3.1 Charcot

All six of the general water quality parameters were measured at this site (Table 4-25).

Table 4-25
Mean and Range of General Water Quality Parameter Values Measured at the Charcot Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	18.2 (11.2 – 21.6)
Temperature (^oC)	18.4 (13.9 – 21.7)
Dissolved Oxygen (mg/l)	8.5 (8.0 – 9.2)
pH (units)	7.9 (7.44 – 8.00)
Conductivity (μmhos/cm)	1171 (1070 – 1370)
Alkalinity (mg $CaCO_3$/l)	375 (360 – 390)

4.3.2 Fleamarket/Muni Golf

All six of the general water quality parameters were measured at this site (Table 4-26).

Table 4-26
Mean and Range of General Water Quality Parameter Values Measured at the Fleamarket/Muni Golf Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	17.6 (12.6 – 24.0)
Temperature (^oC)	18.8 (13.3 – 22.5)
Dissolved Oxygen (mg/l)	8.0 (7.6 – 8.6)
pH (units)	7.80 (7.36 – 7.98)
Conductivity (μmhos/cm)	1151 (1070 – 1360)
Alkalinity (mg $CaCO_3$/l)	375 (370 – 380)

4.3.3 Upper Penitencia Creek

All six of the general water quality parameters were measured at this site (Table 4-27).

Table 4-27
Mean and Range of General Water Quality Parameter Values Measured at the Upper Penitencia Creek Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	7.9 (3.2 – 12.2)
Temperature (^oC)	17.9 (12.8 – 21.7)
Dissolved Oxygen (mg/l)	9.8 (8.2 – 11.5)
pH (units)	7.96 (7.60 – 8.30)
Conductivity (μmhos/cm)	446 (300 – 730)
Alkalinity (mg $CaCO_3$/l)	130

4.3.4 Watson Park Downstream

All six of the general water quality parameters were measured at this site (Table 4-28).

Table 4-28
Mean and Range of General Water Quality Parameter Values Measured at the Watson Park Downstream Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	20.6 (13.8 – 26.3)
Temperature (^oC)	18.1 (13.8 – 21.5)
Dissolved Oxygen (mg/l)	7.3 (6.4 – 8.2)
pH (units)	7.66 (7.08 – 8.00)
Conductivity (μmhos/cm)	1333 (1240 – 1440)
Alkalinity (mg $CaCO_3$/l)	435 (430 – 440)

4.3.5 San Miguelita Creek

All six of the general water quality parameters were measured at this site (Table 4-29).

Table 4-29
Mean and Range of General Water Quality Parameter Values Measured at the San Miguelita Creek Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	24.4 (8.5 – 37.1)
Temperature (^oC)	18.5 (14.1 – 21.6)
Dissolved Oxygen (mg/l)	9.6 (8.1 – 11.3)
pH (units)	7.98 (7.70 – 8.20)
Conductivity (μmhos/cm)	1634 (1580 – 1700)
Alkalinity (mg $CaCO_3$/l)	525 (520 – 530)

4.3.6 Watson Park Upstream

All six of the general water quality parameters were measured at this site (Table 4-30).

Table 4-30
Mean and Range of General Water Quality Parameter Values Measured at the Watson Park Upstream Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	14.3 (9.1 – 22.7)
Temperature (^oC)	18.0 (13.7 – 21.5)
Dissolved Oxygen (mg/l)	5.4 (4.2 – 7.7)
pH (units)	7.45 (6.90 – 7.70)
Conductivity (μmhos/cm)	1007 (920 – 1140)
Alkalinity (mg $CaCO_3$/l)	350 (340 – 360)

4.3.7 Kelley Park

All six of the general water quality parameters were measured at this site (Table 4-31).

Table 4-31
Mean and Range of General Water Quality Parameter Values Measured at the Kelley Park Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	16.5 (7.0 – 20.8)
Temperature (^oC)	18.0 (12.5 – 21.9)
Dissolved Oxygen (mg/l)	7.1 (6.2 – 8.1)
pH (units)	7.57 (7.10 – 7.90)
Conductivity (µmhos/cm)	759 (690 – 910)
Alkalinity (mg $CaCO_3$/l)	250

4.3.8 Stonegate

All six of the general water quality parameters were measured at this site (Table 4-32).

Table 4-32
Mean and Range of General Water Quality Parameter Values Measured at the Stonegate Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	18.9 (8.2 – 29.5)
Temperature (^oC)	18.4 (12.3 – 22.6)
Dissolved Oxygen (mg/l)	7.4 (6.4 – 8.6)
pH (units)	7.75 (7.20 – 8.20)
Conductivity (µmhos/cm)	589 (530 – 690)
Alkalinity (mg $CaCO_3$/l)	200

4.3.9 Singleton

All six of the general water quality parameters were measured at this site (Table 4-33).

Table 4-33
Mean and Range of General Water Quality Parameter Values Measured at the Singleton Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	13.4 (6.4 – 19.3)
Temperature (^oC)	18.7 (12.7 – 23.1)
Dissolved Oxygen (mg/l)	7.3 (6.4 – 8.4)
pH (units)	7.78 (7.10 – 8.40)
Conductivity (µmhos/cm)	579 (540 – 670)
Alkalinity (mg $CaCO_3$/l)	200 (190 – 210)

4.3.10 Hellyer

All six of the general water quality parameters were measured at this site (Table 4-34).

Table 4-34
Mean and Range of General Water Quality Parameter Values Measured at the Hellyer Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	12.4 (4.4 – 17.7)
Temperature (^oC)	18.9 (12.5 – 23.5)
Dissolved Oxygen (mg/l)	7.5 (6.8 – 8.4)
pH (units)	7.80 (7.20 – 8.11)
Conductivity (μmhos/cm)	526 (490 – 590)
Alkalinity (mg $CaCO_3$/l)	195 (190 – 200)

4.3.11 TPS

All six of the general water quality parameters were measured at this site (Table 4-35).

Table 4-35
Mean and Range of General Water Quality Parameter Values Measured at the TPS Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	0.7 (0.6 – 0.9)
Temperature (^oC)	24.8 (23.2 – 26.2)
Dissolved Oxygen (mg/l)	6.5 (5.9 – 7.1)
pH (units)	6.94 (6.50 – 7.20)
Conductivity (μmhos/cm)	1292 (1260 – 1320)
Alkalinity (mg $CaCO_3$/l)	185 (170 – 200)

4.3.12 Reservoir Storage Tank

All six of the general water quality parameters were measured at this site (Table 4-36).

Table 4-36
Mean and Range of General Water Quality Parameter Values Measured at the Reservoir Storage Tank Monitoring Station

Parameter	Mean and (Range)
Turbidity (NTU)	0.7 (0.6 – 0.8)
Temperature (^oC)	24.4 (23.6 – 25.1)
Dissolved Oxygen (mg/l)	2.6 (1.8 – 3.4)
pH (units)	6.87 (6.80 – 6.94)
Conductivity (μmhos/cm)	1293 (1220 – 1360)
Alkalinity (mg $CaCO_3$/l)	175 (160 – 190)

4.4 ORGANOPHOSPHATE PESTICIDES

Three of the most commonly used organophosphate pesticides (chlorpyrifos, diazinon, and malathion) were monitored at the Charcot and Watson Park Downstream stations during the July event.

The concentrations of all three pesticides were below the detection limits of 0.2 μg/l at both stations.

4.5 CHRONIC TOXICITY BIOASSAYS

Chronic toxicity bioassays were performed on aqueous samples collected from the Charcot, Stonegate, Hellyer, and TPS sites during the June monitoring event. The waterflea, *Ceriodaphnia dubia* were used as the biological indicator species for all tests.

Laboratory data sheets containing test results and summary statistics are located in Appendix to this report. Summary statistical results for each test are provided in the following section.

No chronic toxicity was observed in any of the bioassay tests performed (Table 4-37).

Table 4-37
Toxicity Bioassay Test Results for Samples Collected from the Charcot, Stonegate, Hellyer, and TPS Monitoring Stations in June

Monitoring Station	Survival (% Sample)		Reproduction (% Sample)	
	NOEC	LOEC	NOEC	LOEC
Charcot	100	>100	100	>100
Stonegate	100	>100	100	>100
Hellyer	100	>100	100	>100
TPS	100	>100	100	>100

4.6 PATHOGENS

The concentrations of five different pathogens (total coliform, fecal coliform, enterococcus, *Cryptosporidium*, and *Giardia*) were monitored as part of this program. Total coliform, fecal coliform, and enterococcus were monitored at every station, while *Cryptosporidium* and *Giardia* were monitored only at the Charcot, Singleton, and TPS stations.

The arithmetic mean, range, and the number of samples of each of these pathogens are presented in the Appendix to this report. The results for each monitoring site are presented below.

4.6.1 Charcot

All five pathogens were detected in samples collected from the Charcot monitoring station (Table 4-38).

Table 4-38
Mean and Range of Pathogens Measured at the Charcot Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	18,775 (12,375 – 35,500)
Fecal Coliform (colonies/100 ml)	1155 (270 – 3,300)
Enterococcus (colonies/100 ml)	354 (165 – 630)
Cryptosporidium (oocysts/10L)	0.3 (0.1 – 0.7)
Giardia (oocysts/10L)	1.1 (0.2 – 5)

4.6.2 Fleamarket/Muni Golf

Three pathogens were detected in samples collected from the Fleamarket/Muni Golf monitoring station (Table 4-39). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-39
Mean and Range of Pathogens Measured at the Fleamarket/Muni Golf Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	134,175 (15,800 – 700,000)
Fecal Coliform (colonies/100 ml)	39,807 (320 – 233,333)
Enterococcus (colonies/100 ml)	1,293 (170 – 5,300)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.3 Upper Penitencia Creek

Three of the five pathogens were detected in samples collected from the Upper Penitencia Creek monitoring station (Table 4-40). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-40
Mean and Range of Pathogens Measured at the Upper Penitencia Creek Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	17,338 (825 – 71,000)
Fecal Coliform (colonies/100 ml)	526 (130 – 810)
Enterococcus (colonies/100 ml)	442 (230 – 860)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.4 Watson Park Downstream

Three of the five pathogens were detected in samples collected from the Watson Park Downstream monitoring station (Table 4-41). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-41
Mean and Range of Pathogens Measured at the Watson Park Downstream Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	288,840 (16,200 – 1,300,000)
Fecal Coliform (colonies/100 ml)	26,928 (330 – 80,000)
Enterococcus (colonies/100 ml)	1,950 (550 – 7,900)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.5 San Miguelita Creek

Three of the five pathogens were detected in samples collected from the San Miguelita Creek monitoring station (Table 4-42). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-42
Mean and Range of Pathogens Measured at the San Miguelita Creek Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	240,800 (14,000 – 1,350,000)
Fecal Coliform (colonies/100 ml)	18,118 (530 – 100,000)
Enterococcus (colonies/100 ml)	781 (460 – 1,600)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.6 Watson Park Upstream

Three of the five pathogens were detected in samples collected from the Watson Park Upstream monitoring station (Table 4-43). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-43
Mean and Range of Pathogens Measured at the Watson Park Upstream Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	1,610,240 (8,000 – 8,000,000)
Fecal Coliform (colonies/100 ml)	140,850 (300 – 700,000)
Enterococcus (colonies/100 ml)	2,501 (166 – 12,000)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.7 Kelley Park

Three of the five pathogens were detected in samples collected from the Kelley Park monitoring station (Table 4-44). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-44
Mean and Range of Pathogens Measured at the Kelley Park Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	55,292 (16,000 – 180,000)
Fecal Coliform (colonies/100 ml)	2,447 (400 – 9,500)
Enterococcus (colonies/100 ml)	537 (220 – 1,300)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.8 Stonegate

Three of the five pathogens were detected in samples collected from the Stonegate monitoring station (Table 4-45). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-45
Mean and Range of Pathogens Measured at the Stonegate Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	5,226 (430 – 12,000)
Fecal Coliform (colonies/100 ml)	298 (130 – 580)
Enterococcus (colonies/100 ml)	228 (75 – 520)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.9 Singleton

All five pathogens were detected in samples collected from the Singleton monitoring station (Table 4-46).

Table 4-46
Mean and Range of Pathogens Measured at the Singleton Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	1,216 (180 – 2,000)
Fecal Coliform (colonies/100 ml)	156 (60 – 260)
Enterococcus (colonies/100 ml)	123 (75 – 180)
Cryptosporidium (oocysts/10L)	0.1
Giardia (oocysts/10L)	0.5 (0.1 – 1.0)

4.6.10 Hellyer

Three of the five pathogens were detected in samples collected from the Stonegate monitoring station (Table 4-47). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-47
Mean and Range of Pathogens Measured at the Hellyer Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	829 (307 – 1,140)
Fecal Coliform (colonies/100 ml)	143 (53 – 293)
Enterococcus (colonies/100 ml)	210 (70 – 430)
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.6.11 TPS

Three of the five pathogens were detected in samples collected from the TPS monitoring station (Table 4-48).

Table 4-48
Mean and Range of Pathogens Measured at the TPS Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	3
Fecal Coliform (colonies/100 ml)	(<1 – <10)
Enterococcus (colonies/100 ml)	(<1 – <10)
Cryptosporidium (oocysts/10L)	0.1
Giardia (oocysts/10L)	2.7 (1 – 8)

4.6.12 Reservoir Storage Tank

One of the five pathogens was detected in samples collected from the Reservoir Storage Tank monitoring station (Table 4-49). *Cryptosporidium* and *Giardia* were not analyzed at this station.

Table 4-49
Mean and Range of Pathogens Measured at the Reservoir Storage Tank Monitoring Station

Pathogen	Mean and (Range)
Total Coliform (colonies/100 ml)	910
Fecal Coliform (colonies/100 ml)	<10
Enterococcus (colonies/100 ml)	<10
Cryptosporidium (oocysts/10L)	Na
Giardia (oocysts/10L)	Na

4.7 CONTINUOUS MEASUREMENTS

Continuous stream measurements of temperature, pH, and dissolved oxygen were recorded at the Charcot, Kelley Park, and Singleton monitoring stations using YSI 600XL Sonde *in situ* multi-sensor units. Each unit was deployed in a deep (~ 2 – 3') pool at each of the monitoring stations and retrieved one week later. Measurements were recorded every 15 minutes from deployment until retrieval.

Continuous temperature loggers were deployed at seven stations between May 09 and September 18, 2000. These loggers were secured along the creek bank, below the surface, and hidden from view. Readings were recorded every 15 minutes for the duration of deployment and downloaded onto a shuttle logger on a monthly basis. It should be noted that there are gaps in the data caused by lost loggers.

4.7.1 YSI Meters

The three units were deployed on a "week on/week off' basis between May 10, 2000 and November 02, 2000. The data are summarized in Table 4-50.

Temperature – Mean temperatures remained fairly constant over time at all three stations. Maximum water temperatures were recorded in June in all stations, with about a two degree difference between the lowest maximum (Charcot) and the highest maximum (Singleton). Minimum water temperatures were recorded in November at the Singleton station. Diurnal temperature variations were also consistent across stations, averaging approximately two degrees daily between the minimum and maximum values.

pH – Mean pH values were also fairly constant over time at all three stations. Maximum and minimum pHs were recorded in May at the Singleton and Kelley Park stations, respectively. Diurnal pH variations were relatively low (<0.5 pH unit), however there was a pattern of increasing diurnal variation from the downstream station (Charcot) to the upstream station (Singleton).

Conductivity – Mean conductivity values in the creek increased with distance downstream. The most downstream site (Charcot) exhibited mean values that were almost twice (1166 vs. 590 μS/cm) the mean value observed at the most upstream site (Singleton). The site located between the two extremes had a mean conductivity that fell between the extremes. Average diurnal variation was greatest at the most downstream site, exhibiting almost twice the variation observed at the other two sites.

Dissolved Oxygen/Dissolved Oxygen Saturation – Mean dissolved oxygen and oxygen saturation levels remained near saturation levels at all three stations over time, averaging between 75 – 89% saturation. Dissolved oxygen minimum levels were recorded in August at the Singleton station and in May at the Kelley Park station. Average diurnal range in dissolved oxygen levels and in saturation levels was fairly constant at all stations over time, with the average diurnal range in oxygen saturation ranging from 14 – 20 percent.

4.7.2 Continuous Temperature Loggers

The seven units were deployed on a continuous basis between May 11, 2000 and September 18, 2000. Deployment locations were Charcot, Upper Penitencia Creek, Watson Park Upstream, Kelley Park, Singleton, Hellyer, and TPS. The data are summarized in Table 4-51.

Table 4-50
Summary of YSI Continuous Monitoring Results

Station	Minimum	Maximum	Mean	Average Diurnal Range
Temperature (°C):				
Charcot (5/10 – 8/24/00)	15.8	24.3	20.1	2.0
Kelley Park (5/10 – 9/28/00)	15.3	24.7	20.1	2.1
Singleton (5/10 – 11/9/00)	11.8	25.5	19.3	1.7
pH:				
Charcot (5/10 – 8/24/00)	7.67	8.18	8.04	0.08
Kelley Park (5/10 – 9/28/00)	7.49	8.45	7.84	0.15
Singleton (5/10 – 11/9/00)	7.63	9.03	8.10	0.45
Conductivity (μS/cm):				
Charcot (5/10 – 8/24/00)	612	1459	1166	142
Kelley Park (5/10 – 9/28/00	403	953	743	71
Singleton (5/10 – 11/9/00)	444	963	590	81
DO (% Saturation):				
Charcot (5/10 – 8/24/00)	69	104	89	14
Kelley Park (5/10 – 9/28/00)	49	100	75	20
Singleton (5/10 – 11/9/00)	56	112	80	19
DO (mg/l):				
Charcot (5/10 – 8/24/00)	6.4	9.7	8.1	1.2
Kelley Park (5/10 – 9/28/00)	4.9	9.3	6.7	1.5
Singleton (5/10 – 11/9/00)	4.5	10.4	7.3	1.6

Table 4-51
Summary of Temp-Logger Continuous Temperature Monitoring Results

Station	Minimum	Maximum	Mean	Average Diurnal Range
Charcot (5/12 – 9/12/00)[1]	15.7	25.2	20.3	2.2
Upper Penitencia (8/1 – 9/12/00)	16.7	27.0	20.7	4.8
Watson Park Upstream (8/1 – 9/12)	17.3	23.3	19.9	1.2
Kelley Park (5/11 – 9/13/00)[2]	15.3	25.0	20.2	2.3
Singleton (5/12 – 9/19/00)	14.9	26.0	21.0	2.1
Hellyer (5/12 – 9/13/00)[3]	15.5	27.1	20.8	2.2
TPS (5/9 – 9/18/00)	22.5	27.0	25.4	0.7

[1] 5/12 – 7/11, 8/1 – 9/12
[2] 5/11 – 7/12, 8/2 – 9/13
[3] 5/12 – 6/23, 8/2 – 9/13

Temperature – Mean temperatures remained fairly constant over time at all six creek stations, with there being an approximate one degree difference between the station having the lowest mean (Watson Park Upstream) and that having the highest (Singleton). The temperature of the recycled water at the TPS averaged approximately five degrees warmer than that recorded for the creek stations.

Maximum water temperatures were recorded in August at the Upper Penitencia Creek, Watson Park Upstream, Hellyer and TPS stations and in June at the Charcot, Kelley Park, and Singleton stations. There was a four degree temperature range between maxima.

Minimum water temperatures were also split, with four of the creek sites and the TPS site recording minima in May and the remaining two stations (Upper Penitencia Creek and Watson Park Upstream) having minima in September. It should be noted, however, that neither of these sites have data for the month of May.

Diurnal temperature variations were also consistent across the majority of stations; averaging approximately two degrees at the Charcot, Kelley Park, Singleton, and Hellyer stations. Upper Penitencia Creek had the greatest average diurnal range, with there being a 4.8 degree swing between daily minimum and maximum temperatures. Watson Park Upstream recorded the lowest diurnal range (1.2 degrees) of the Coyote Creek Stations. The recycled water at the TPS station exhibited the most consistent temperatures and had the lowest average diurnal range of 0.7 degrees.

Air temperatures and dew point were measured and relative humidity calculated for a site on the Singleton Landfill, away from Coyote Creek. The Singleton Landfill site is the proposed location for the dechlorination and cooling equipment. Air temperatures were recorded to provide site-specific data to be used in the design of the cooling tower and chiller equipment specifications. These data are separate from and have no influence on the water quality data collected in Coyote Creek, and will not be discussed in this report.

SECTION 5.0
DISCUSSION

The results from each of the measured water quality parameters were first compared to the lowest applicable water quality criteria and then to the water quality of the recycled water collected from the TPS monitoring site on Zanker Road. This comparison provides an overall picture of the baseline water quality in Coyote Creek and the potential effects that recycled water will have on creek water quality. The lowest appropriate criteria that were used in this comparison were chosen from:

- California Toxics Rule (CTR) for freshwater and human health (Federal Register May 2000) and
- Water Quality Criteria Plan for the San Francisco Bay Basin (Basin Plan 1995)

Temperature values recorded at the various creek sites were compared to guidelines issued by the California Department of Fish and Game (CDFG) for coldwater fisheries (Raleigh *et al*., 1984, 1986; Rich 1987). Temperatures of the TPS samples were not used in the comparison for two reasons, (1) the recycled water temperature was recorded at the pump station and not at the release location and (2) the recycled water will be artificially cooled before release into Coyote Creek to meet the CDFG guidelines.

5.1 METALS

Metals concentrations in South San Francisco Bay creeks are of particular concern since the creeks are a source of metals into the Lower South San Francisco Bay, which is a 303(d) listed waterbody for metals. In addition, small concentrations of metals (*e.g.*, µg/l or parts per billion) can be toxic to aquatic organisms. With this in mind, the CTR and the Water Quality Control Plan for the San Francisco Basin (Basin Plan 1995) provide a set of water quality criteria for ten priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc).

The toxicity of several of these metals (cadmium, copper, lead, nickel, silver, and zinc) is inversely proportional to water hardness (expressed as mg $CaCO_3$/l). Thus, as water hardness increases, metal toxicity decreases (*i.e.*, it takes more metal to produce the same toxic effect). Figure 5-1 summarizes the minimum hardness value collected at each of the sites over the duration of the monitoring period. This figure indicates that water hardness exhibits a decreasing trend with increasing distance upstream (excluding the two tributaries) from the Charcot station, which is the site that has the greatest potential for being influenced by runoff and Bay waters. The Hellyer station is least influenced by runoff and water from the Bay. This trend in hardness is expected since the greater distance a stream travels, the greater the potential for contamination by either runoff or seawater intrusion, both of which contain divalent cations (*e.g.*, calcium and magnesium), of which hardness is composed.

Table 5-1 provides a comparison of the Total metals concentrations from each of the Coyote Creek and tributary monitoring stations, as well as from the TPS and Reservoir Storage Tank stations to the lowest applicable criteria. Historically, water quality standards for metals were based solely on the "Total" metal fraction. However, the newly promulgated CTR, as well as the soon to be revised "Basin Plan" for the San Francisco Bay Basin will base water quality standards on the "Dissolved" fraction of metals. As a measure of conservatism, we report and compare "Total" metals concentrations to the lowest applicable standard. Where appropriate, the criteria have been adjusted for a water hardness of 204 mg $CaCO_3$/l. This hardness represents the lowest measured hardness value for the creek (at the Hellyer station), which results in the most conservative adjusted metals criteria. The minimum reported hardness value from Upper Penitencia Creek, while considerably lower (75 mg $CaCO_3$/l), was not used in the calculations since it is from a tributary flowing into Coyote Creek and will not be affected by metals concentrations in Coyote Creek or by the release of recycled water.

5.1.1 Metals Exceedances

There were no metals exceedances during the 2000 monitoring period.

5.1.2 Creek Metals Concentrations Compared to Recycled Water Metals Concentrations

Metals concentrations observed in Coyote Creek during the study period were very similar to those observed in the recycled water during the same time period, with the exceptions of lead and zinc (Table 5-1).

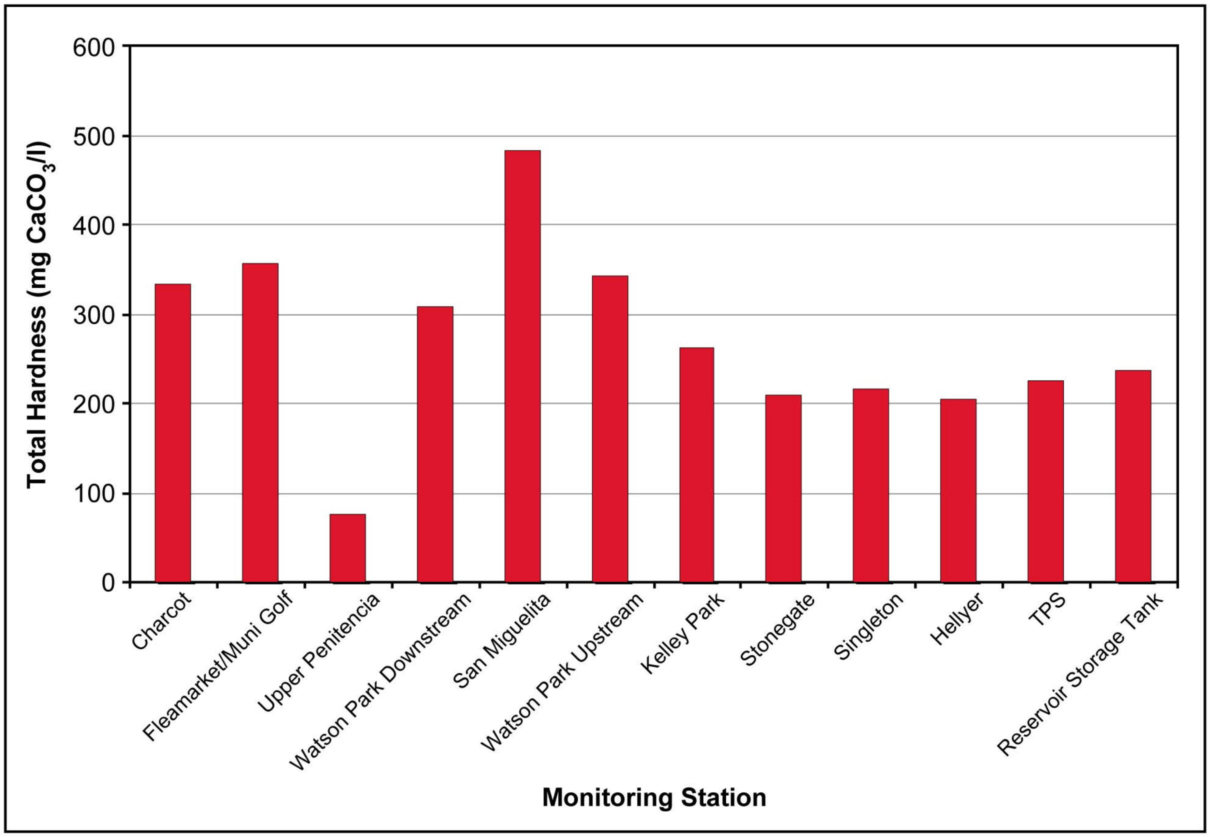

Figure 5-1. Minimum total hardness values in Coyote Creek, Tributary, and TPS samples during the 2000 monitoring period.

Table 5-1
Coyote Creek, Tributary, and TPS Mean and (Maximum)
Water Quality Values Compared to the Lowest Applicable Criteria

Parameter	Monitoring Sites: Charcot	Monitoring Sites: Fleamarket/ Muni Golf	Monitoring Sites: Upper Penitencia Creek	Monitoring Sites: Watson Park Downstream	Lowest Applicable Criteria: CTR (Freshwater/ Human Health)	Lowest Applicable Criteria: Basin Plan (1995)
Total Metals (µg/l) [Criteria Corrected for Minimum Creek Hardness of 204 mg $CaCO_3$/l]						
Arsenic	2.4 (2.6)	2.5 (2.6)	1.8 (2.0)	2.4 (2.6)	150	190
Cadmium	0.2 (0.2)	<0.5	<0.5	0.2	4.5	2
Chromium	2.9 (6.5)	2.7 (5.1)	1.2 (1.7)	2.9 (3.8)	11	11
Copper	3.4 (5.2)	3.4 (5.1)	5.1 (7.1)	2.8 (3.8)	20	22
Lead	1.6 (2.0)	1.7 (2.0)	0.7	2.4 (3.3)	7.0	8
Mercury	0.005 (0.007)	0.006 (0.007)	0.003 (0.004)	0.007 (0.010)	0.051	0.05 (South Bay)
Nickel	5.1 (6.7)	4.6 (6.0)	2.4 (4.8)	5.2 (6.0)	102	288
Selenium	1.9 (2.1)	1.9 (2.2)	0.2 (0.4)	2.4 (2.8)	5	NA
Silver	0.6 (1.0)	<1.0	<1.0	<1.0	17	14
Zinc	13 (29)	15 (28)	10 (20)	18 (43)	262	194
Nutrients (mg/l)						
Phosphate	1.5	<1.0	<1.0	<1.0	NA	Shall not promote nuisance algal growth
Ortho-Phosphate	0.09 (0.11)	0.09 (0.11)	0.05 (0.08)	0.10 (0.14)	NA	
Total Phosphorus	0.19 (0.49)	0.15 (0.18)	0.10 (0.17)	0.22 (0.39)	NA	
Nitrate	3.0 (3.8)	3.0 (3.8)	0.2 (0.35)	3.8 (4.4)	NA	
Ammonia	0.3 (<1.0)	0.3 (<1.0)	0.3 (<1.0)	0.3 (<1.0)	NA	NA
Unionized Ammonia (median)	0.009 (0.003)	0.008 (0.003)	0.012 (0.005)	0.007 (0.002)	NA	Annual median < 0.025
General Water Quality Parameters						
pH (units)	7.90 (8.00	7.80 (7.98)	7.96 (8.30)	7.66 (8.00)	NA	6.5 – 8.5
DO (mg/l) [minimum]	8.5 (8.0)	8.0 (7.6)	9.8 (8.2)	7.3 (6.4)	NA	>5.0
Turbidity (NTU)	18.2 (21.6)	17.6 (24.0)	7.9 (12.2)	20.6 (26.3)	NA	Shall not cause nuisance or adversely affect beneficial uses
Pathogens (CFU/100 ml)						
Total Coliform [median]	18,775 (35,500) [14,000]	134,175 (700,000) [20,000]	17,338 (71,000) [3,500]	288,840 (1,300,000) [21,000]	Median < 240; No Sample > 10,000	
Fecal Coliform [Log Mean]	1,155 (3,300) [815]	39,807 (233,333) [1,911]	526 (810) [462]	26,928 (80,000) [3,718]	Log Mean < 200; 90th Percentile <400	
Enterococcus	354 (630)	1,293 (95,300)	442 (860)	1,950 (7,900)	Steady State <33	

Table 5-1 (continued)
Coyote Creek, Tributary, and TPS Mean and (Maximum)
Water Quality Values Compared to the Lowest Applicable Criteria

Parameter	Monitoring Sites				Lowest Applicable Criteria	
	San Miguelita Creek	Watson Park Upstream	Kelley Park	Stonegate	CTR (Freshwater/ Human Health)	Basin Plan (1995)
Total Metals (µg/l) [Criteria Corrected for Minimum Creek Hardness of 204 mg $CaCO_3$/l]						
Arsenic	2.3 (2.8)	2.4 (3.0)	2.5 (3.0)	2.2 (3.1)	150	190
Cadmium	0.2 (0.2)	<0.5	0.4 (0.5)	<0.5	4.5	2
Chromium	2.9 (4.6)	3.0 (5.6)	4.5 (5.5)	3.9 (5.5)	11	11
Copper	2.9 (3.9)	2.5 (3.0)	3.3 (4.1)	2.7 (3.6)	20	22
Lead	2.2 (3.0)	2.9 (5.0)	2.1 (3.0)	1.7 (3.0)	7.0	8
Mercury	0.007 (0.014)	0.010 (0.015)	0.009 (0.012)	0.007 (0.011)	0.051	0.05 (South Bay)
Nickel	3.7 (5.3)	7.0 (11.0)	8.6 (10.5)	9.0 (12.1)	102	288
Selenium	2.8 (3.1)	2.0 (2.7)	1.1 (1.4)	0.3 (0.4)	5	NA
Silver	<1.0	<1.0	<1.0	<1.0	17	14
Zinc	17 (33)	13 (27)	12 (14)	10 (12)	262	194
Nutrients (mg/l)						
Phosphate	<1.0	<1.0	<1.0	<1.0	NA	Shall not promote nuisance algal growth
Ortho-Phosphate	0.10 (0.15)	0.11 (0.13)	0.05 (0.07)	0.03 (0.05)	NA	
Total Phosphorus	0.15 (0.22)	0.28 (0.62)	0.14 (0.24)	0.11 (0.20)	NA	
Nitrate	6.6 (6.8)	1.4 (2.0)	1.0 (1.4)	0.8 (1.1)	NA	
Ammonia	0.3 (<1.0)	0.2 (<1.0)	<1.0	<1.0	NA	NA
Unionized Ammonia (median)	0.011 (0.005)	0.004 (0.001)	0.005 (0.001)	0.008 (0.002)	NA	Annual median < 0.025
General Water Quality Parameters						
pH (units)	7.98 (8.20)	7.45 (7.70)	7.57 (7.90)	7.75 (8.20)	NA	6.5 – 8.5
DO (mg/l) [minimum]	9.6 (8.1)	5.4 (4.2)	7.1 (6.2)	7.4 (6.4)	NA	>5.0
Turbidity (NTU)	24.4 (37.1)	14.3 (22.7)	16.5 (20.8)	18.9 (29.5)	NA	Shall not cause nuisance or adversely affect beneficial uses
Pathogens (CFU/100 ML)						
Total Coliform [Median]	240,800 (1,350,000) [19,900]	1,610,240 (8,000,000) [15,000]	55,292 (180,000) [22,375]	5,226 (12,000) [3,100]	Median < 240; No Sample > 10,000	
Fecal Coliform [Log Mean]	18,118 (100,000) [2,737]	140,850 (700,000) [2,491]	2,447 (9,500) [1,188]	298 (580) [255]	Log Mean < 200; 90th Percentile <400	
Enterococcus	781 (1,600)	2,501 (12,000)	537 (1,300)	228 (520)	Steady State <33	

Table 5-1 (continued)
Coyote Creek, Tributary, and TPS Mean and (Maximum)
Water Quality Values Compared to the Lowest Applicable Criteria

Parameter	Monitoring Sites: Singleton	Hellyer	TPS	Storage Reservoir Tank	Lowest Applicable Criteria: CTR (Freshwater/ Human Health)	Basin Plan (1995)
Total Metals (µg/l) [Criteria Corrected for Minimum Creek Hardness of 204 mg $CaCO_3$/l]						
Arsenic	2.5 (4.3)	1.5 (1.7)	0.8 (1.1)	2.4 (2.6)	150	190
Cadmium	<0.5	<0.5	<0.5	0.2	4.5	2
Chromium	3.8 (6.3)	2.1 (3.6)	0.9 (1.5)	2.9 (3.8)	11	11
Copper	2.5 (3.9)	1.9 (3.0)	4.3 (6.0)	2.8 (3.8)	20	22
Lead	1.1 (2.0)	0.9 (1.0)	0.8 (1.0)	2.4 (3.3)	7.0	8
Mercury	0.007 (0.009)	0.007 (0.009)	0.002	0.007 (0.010)	0.051	0.05 (South Bay)
Nickel	7.8 (11.0)	6.2 (9.4)	7.5 (8.3)	5.2 (6.0)	102	288
Selenium	0.3 (0.3)	0.2 (0.3)	0.5 (0.6)	2.4 (2.8)	5	NA
Silver	<1.0	<1.0	<1.0	<1.0	17	14
Zinc	14 (21)	52	61 (88)	18 (43)	262	194
Nutrients (mg/l)						
Phosphate	<1.0	<1.0	2.4 (3.9)	4.3	NA	Shall not promote nuisance algal growth
Ortho-Phosphate	0.02 (0.04)	0.01 (0.02)	0.61 (1.1)	1.1 (1.5)	NA	
Total Phosphorus	0.08 (0.15)	0.08 (0.21)	0.93 (1.4)	1.4 (1.8)	NA	
Nitrate	2.1 (7.0)	2.2 (6.6)	10.6 (12.7)	10.2 (10.4)	NA	
Ammonia	<1.0	<1.0	0.7 (1.2)	0.2	NA	NA
Unionized Ammonia (Median)	0.010 (0.003)	0.010 (0.003)	0.003 (0.005)	0.001	NA	Annual median < 0.025
General Water Quality Parameters						
pH (units)	7.78 (8.40)	7.80 (8.11)	6.94 (7.20)	6.87 (6.94)	NA	6.5 – 8.5
DO (mg/l)	7.3 (6.4)	7.5 (8.4)	6.5 (5.9)	2.6 (1.8)	NA	>5.0
Turbidity (NTU)	13.4 (19.3)	12.4 (17.7)	0.7 (0.9)	0.7 (0.8)	NA	Shall not cause nuisance or adversely affect beneficial uses
Pathogens (CFU/100 ml)						
Total Coliform [Median]	1,216 (2,000) [1,318]	829 (1,140) [864]	3	910	Median < 240; No Sample > 10,000	
Fecal Coliform [Log Mean]	156 (260) [138]	143 (293) [118]	<10	<10	Log Mean < 200; 90th Percentile <400	
Enterococcus	123 (180)	210 (430)	<10	<10	Steady State <33	

Lead concentrations in the recycled water (TPS) were generally lower than those observed in Coyote Creek and very similar to those observed in Upper Penitencia Creek. Lead concentrations measured in the Reservoir Storage Tank were very similar to those measured in Coyote Creek. It is unknown at this time why the Reservoir Storage Tank contained greater concentrations of lead than were measured in the TPS samples. The lower lead concentrations in the recycled water would only act to dilute the concentrations present in the creek.

Zinc concentrations were three to four times greater in the recycled water collected from the TPS site than measured in all creek sites, except Hellyer, which had one measurement that was fairly close to the mean TPS zinc concentration. Once again, it is unknown why the zinc concentration in the Reservoir Storage Tank was one-third to one-half that measured in the TPS samples. The higher zinc concentrations observed in the recycled water might cause zinc concentrations in the creek to increase. However, because the maximum concentration of zinc measured in the recycled water samples was 88 µg/l, any increase in the concentration of zinc in the creek would still be less than 50 percent of the lowest applicable criterion concentration of 194 µg/l, based on the most conservative creek hardness value of 204 mg $CaCo_3$/l.

5.2 NUTRIENTS

Existing water quality criteria for nutrients (phosphorous and nitrogen) are narrative in nature and provide no numeric guidance. The Basin Plan (1995) states that,

> *“Waters shall not contain biostimulatory substances that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses”*

Since there are no numeric criteria available, only a qualitative analysis of the data can be made. The data indicate that measurable concentrations of phosphorus and nitrogen were detected at all of the monitoring stations during the sampling period (Table 5-1).

Nitrogen - These results indicate that concentrations of nitrate exhibited a trend along the creek, with the lower concentrations occurring at the more upstream stations and the higher concentrations at the downstream stations. The upstream stations (Watson Park Upstream, Kelley Park, Stonegate, Singleton, and Hellyer) averaged approximately 1.0 mg/l nitrate, while the downstream stations averaged approximately 3 mg/l nitrate. This excludes two extremely elevated data points at the Singleton and Hellyer stations from July, when concentrations were almost seven times greater than previously observed at these stations. This trend observed with nitrate is not entirely unexpected since nitrates tend to move through the soil and water without sorbing.

Phosphorus - Phosphorus compounds (phosphate, ortho-phosphate, and total phosphorus) exhibited a more mixed pattern, except at the two most upstream stations (Singleton, and Hellyer) where the concentrations were consistently lower (approximately 0.10 mg-P/l) than those observed at the downstream stations (approximately 0.25 mg-P/l).

Ammonia - Quantifiable concentrations of ammonia were measured at all monitoring stations, except Kelley Park, Stonegate, Singleton, and Hellyer. All quantifiable mean and median concentrations were below 1.0 mg/l, except for a single instance in September in the TPS monitoring sample where the concentration was 1.2 mg/l. While ammonia is a nutrient, it is also very toxic to aquatic life in its unionized form (NH_3) and it is the only nutrient to have a numeric criterion (Table 5-1). The concentration of unionized ammonia in aqueous solution is directly proportional to the pH, temperature, and total ammonia concentration of the sample (Khoo, *et al.*, 1977; Whitfield 1974; Whitfield 1978; and Phillips, *et al.*, 1997). Using the maximum values for temperature, pH, and corresponding total ammonia concentration, the maximum concentration of unionized ammonia was calculated for all samples collected during the 2000 monitoring study. To assure that we used the most conservative approach in calculating the unionized ammonia concentration, non-detect values are included at "detection value". For example, if the total ammonia concentration was reported as <1.0 mg/l, a value of 1.0 mg/l was used for the calculation, thus assuring the most conservative estimate of unionized ammonia. To determine the level of risk that each sample had to aquatic life, the median was calculated and compared to the lowest applicable criterion. The medians ranged from 0.001 – 0.005 mg-N/l (Table 5-1).

5.2.1 Nutrient Exceedances

As mentioned previously, there are no numeric water quality criteria for nutrients, except for ammonia. However, there was no indication of biostimulation to aquatic algae or plants being caused by elevated concentrations of nutrients (See Section 5.2.2).

The only nutrient that has a numeric water quality criterion is unionized ammonia. The results of the calculations indicate that unionized ammonia was not present in any of the samples in concentrations that would be considered harmful to aquatic life.

5.2.2 Creek Nutrient Concentrations Compared to Recycled Water Nutrient Concentrations

Nutrient concentrations observed in the recycled water samples (TPS and Reservoir Storage Tank) were greater than those observed to occur in Coyote Creek. In general, concentrations of phosphorus were almost an order of magnitude greater in the recycled water than in creek samples and between three and ten times greater with respect to nitrate. This suggests that the release of recycled water into Coyote Creek would cause an increase in the concentration of these nutrients and the potential exists to stimulate algal and plant growth. However, while all samples contained quantifiable concentrations of nutrients that could result in biostimulation of nuisance aquatic plants and algae, there is no indication that Coyote Creek or its tributaries are being impaired by an excess concentration of nutrients.

Dr. Rhea Williamson (San Jose State University, 2001) has determined that existing nutrient concentrations in Coyote Creek are greater than saturation and should be resulting in biostimulation to the predominant alga in the creek. However, she has found very low levels of chlorophyll-a to be present in the creek. This indicates that nutrients are not currently the factors limiting biostimulation in the creek. Likely limiting factors include unsatisfactory substrate and high turbidity in the creek.

Dr. Williamson's study indicates that, since the creek is currently not nutrient limited, additional inputs of nutrients into the creek would not automatically result in biostimulation, which would lead to eutrophication and subsequent depressed oxygen levels.

5.3 GENERAL WATER QUALITY PARAMETERS

5.3.1 Coyote Creek and Tributaries

Water quality criteria exist for two of the general water quality parameters measured (pH and dissolved oxygen). These criteria Table 5-1 indicate that the acceptable pH range is between 6.5 and 8.5 pH units and that dissolved oxygen concentrations must not fall below 5.0 mg/l.

Dissolved Oxygen - Dissolved oxygen (DO) concentrations were greater than the lowest appropriate criterion of 5.0 mg/l at all sites along the creek and at all monitoring events, except at the Watson Park Upstream station, where DO levels dropped to a minimum of 4.2 mg/l in November. Dissolved oxygen concentrations also fell below the 5.0 mg/l limit on two other occasions at this station, once in September (4.5 mg/l) and again in October (4.3 mg/l). It should be noted that the DO measurements were recorded between 8 am and 1 pm and not during the time of day when the lowest DO values would be expected (prior to sunrise).

Dissolved oxygen was measured on a continuous basis at three of the monitoring stations (Charcot, Kelley Park, and Singleton) in an effort to capture the diurnal variability of this parameter. These values were also compared to the lowest applicable criterion (Table 5-2). The continuous data indicate that DO levels at the Kelley Park and Singleton monitoring stations dropped to levels slightly below the 5.0 mg/l limit and that the drops occurred in the pre-dawn to early morning hours of May.

Table 5-2
Coyote Creek and TPS Mean and (Range) Continuously Monitored Water Quality Values Compared to the Lowest Applicable Criteria

	Monitoring Site			Lowest Applicable Criteria	
Parameter	Charcot	Kelley Park	Singleton	CTR (Freshwater/ Human Health)	Basin Plan (1995)
pH (units)	8.04 (7.67 – 8.18)	7.84 (7.49 – 8.45)	8.10 (7.63 – 9.03)	NA	6.5 – 8.5
DO (mg/l)	8.1 (6.4 – 9.7)	6.7 (4.9 – 9.3)	7.3 (4.5 – 10.4)	NA	>5.0

pH - The pH range observed at all of the monitoring stations was within acceptable criterion limits of 6.5 – 8.5. However, the YSI continuous monitoring pH meter detected elevated pH values at the Singleton site during the early evening (3 - 8 pm) hours of May, when pH levels rose to a maximum of 9.03. This observation is not entirely unexpected since photosynthetic activity during the day would tend to increase pH by early evening, with respiration occurring at night, resulting in increased carbon dioxide production and lower pH values observed during the early morning hours.

Temperature - None of the three criteria sources have defined specific temperature criteria. However, since one of the proposed objectives of the streamflow augmentation pilot project is to make the stream habitable to coldwater fishes, salmonids, specifically, the CDFG has set temperature guidelines that must be met. These guidelines state,

> *"At no time shall the temperature exceed 13.9 ^{o}C in May, 17.8 ^{o}C in June, 20 ^{o}C in July through September, and 13.9 ^{o}C in October."*

Based on these "criteria", the existing water temperatures of Coyote Creek are not suitable to sustain a coldwater fishery. Maximum stream temperatures are up to 10 ^{o}C higher than the 13.9 ^{o}C limit in May (Figure 5-2). Mid-August and early September are the only months where maximum temperatures were within CDFG guidelines. Maximum temperatures at Kelley Park were greater than the 13.9 ^{o}C limits by almost 10 ^{o}C (Figure 5-2).

5.3.2 Creek General Water Quality Parameters Compared to Recycled Water General Water Quality Parameters

Dissolved Oxygen - Dissolved oxygen concentrations in the recycled water were comparable to those found in the creek and were not observed to fall below the 5.0 mg/l criterion. The single exception is the recycled water collected from the Reservoir Storage Tanks, which exhibited extremely low DO levels. At this time it is unknown why the Reservoir Storage Tank DO values averaged 2.6 mg/l, with a minimum of 1.8 mg/l.

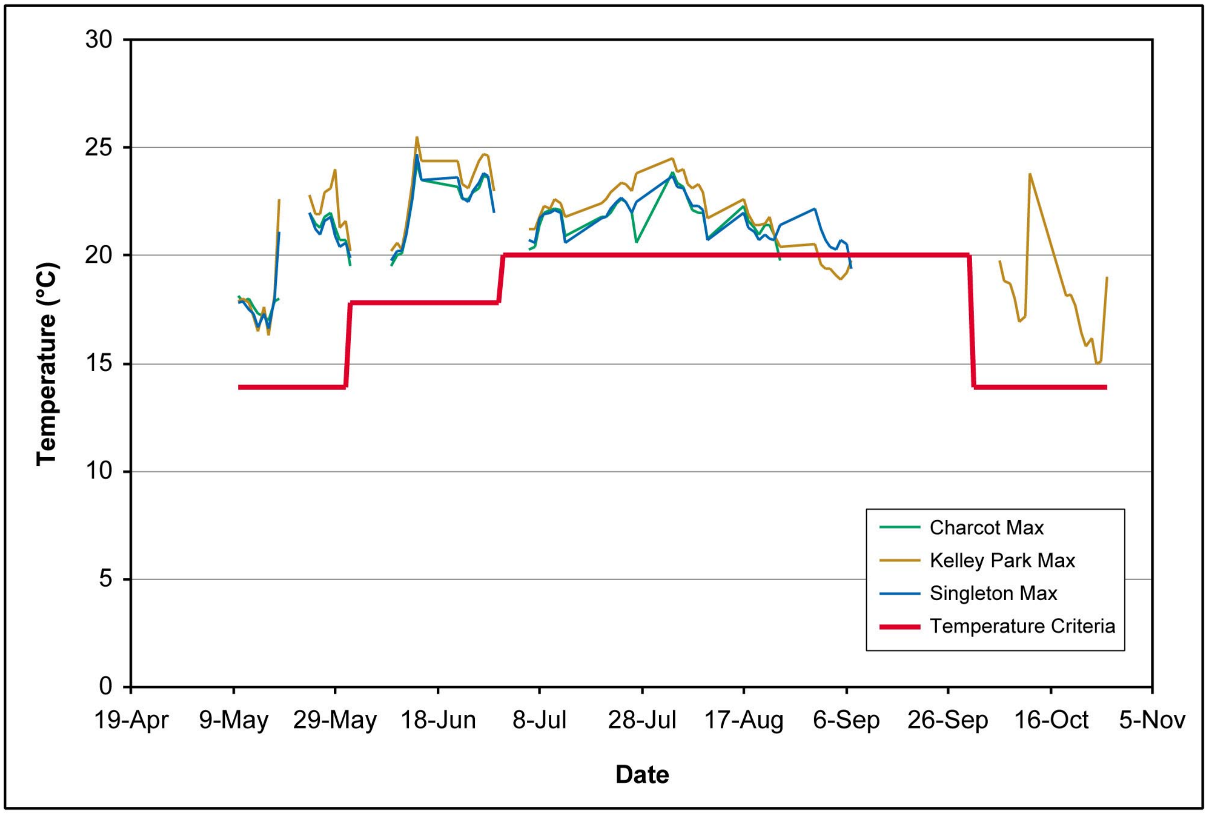

Figure 5-2. Summer 2000 Coyote Creek daily maxima temperatures.

pH - The pH of the recycled water was slightly lower (mean = 6.90) than that observed in the creek (mean of all sites = 7.76) but remained within acceptable water quality limits (Table 5-1).

Temperature - The temperature of the recycled water will be artificially cooled prior to release into the creek making it suitable for coldwater fish.

5.4 CHRONIC TOXICITY BIOASSAYS

Chronic toxicity bioassays using the waterflea, *Ceriodaphnia dubia* indicated that neither the creek samples nor the recycled water samples collected in June contained any lethal (survival) or sublethal (reproductive) toxicity.

5.5 PATHOGENS

Water quality criteria exist for three of the measured pathogens (total and fecal coliform and enterococcus) (Table 5-1). These parameters were measured at each sampling event (except

August) and at all of the monitoring stations and are compared to the lowest applicable criteria in the following sections.

5.5.1 Charcot

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90th percentile criteria.

The mean concentration of enterococcus measured at this site (354) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.2 Fleamarket/Muni Golf

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90th percentile criteria.

The mean concentration of enterococcus measured at this site (1,293) was two orders of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.3 Upper Penitencia Creek

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90th percentile criteria.

The mean concentration of enterococcus measured at this site (442) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.4 Watson Park Downstream

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90^{th} percentile criteria.

The mean concentration of enterococcus measured at this site (1,950) was two orders of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.5 San Miguelita Creek

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90^{th} percentile criteria.

The mean concentration of enterococcus measured at this site (781) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.6 Watson Park Upstream

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90^{th} percentile criteria.

The mean concentration of enterococcus measured at this site (12,000) was three orders of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.7 Kelley Park

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded both the log mean and 90th percentile criteria.

The mean concentration of enterococcus measured at this site (537) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.8 Stonegate

Total coliform concentrations were elevated at this site during all sampling events. Neither the median criterion of <240 CFU/100 ml nor the maximum limit of 10,000 CFU/100 ml were met.

Measurable fecal coliform concentrations were observed at this site during all sampling events and exceeded the log mean criteria. However, the 90th percentile criteria was met.

The mean concentration of enterococcus measured at this site (228) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.9 Singleton

Total coliform concentrations were elevated at this site during all sampling events. The median criterion of <240 CFU/100 ml was not met. However, since the maximum measured concentration was 2,000 CFU/100 ml, the maximum limit of 10,000 CFU/100 ml was not exceeded.

Measurable fecal coliform concentrations were observed at this site during all sampling events but did not exceed either the log mean criteria or the 90th percentile criterion.

The mean concentration of enterococcus measured at this site (123) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.10 Hellyer

Total coliform concentrations were elevated at this site during all sampling events. The median criterion of <240 CFU/100 ml was not met. However, since the maximum measured concentration was 1,140 CFU/100 ml, the maximum limit of 10,000 CFU/100 ml was not exceeded.

Measurable fecal coliform concentrations were observed at this site during all sampling events but did not exceed either the log mean criteria or the 90th percentile criterion.

The mean concentration of enterococcus measured at this site (210) was an order of magnitude greater than the steady state criterion of 33 CFU/100 ml.

5.5.11 TPS

Total coliform concentrations were quantifiable at this site once during the June sampling event. However, neither of the criteria for this parameter was exceeded.

Measurable fecal coliform concentrations were not observed at this site during any of the sampling events, and, therefore did not exceed either of the criteria for this parameter.

Quantifiable concentrations of enterococcus were not observed at this site during any of the sampling events and, therefore did not exceed the steady state criterion of 33 CFU/100 ml.

5.5.12 Reservoir Storage Tank

Total coliform concentrations were quantifiable at this site once during the September sampling event and exceeded the median criterion of <240 CFU/100 ml. However, since the maximum recorded concentration of this parameter was 910 CFU/100 ml, the maximum criterion was not exceeded.

Measurable fecal coliform concentrations were not observed at this site during any of the sampling events, and, therefore did not exceed either of the criteria for this parameter.

Quantifiable concentrations of enterococcus were not observed at this site during any of the sampling events and, therefore did not exceed the steady state criterion of 33 CFU/100 ml.

5.5.13 Comparison of Creek and Recycled Water Pathogen Concentrations

Concentrations of pathogens in the recycled water samples were considerably lower than those observed in the Creek samples, with differences being up to six orders of magnitude. Thus indicating that the release of recycled water into Coyote Creek would result in diluting the concentrations of background pathogens to levels that would be potentially lower than current water quality criteria.

SECTION 6.0
DATA ISSUES

There were two basic issues that affected data analyses for the 1999 study. They were precision and dissolved vs. total metals concentrations. The 1999 monitoring report (Tetra Tech, 2000) described certain remedial steps that would be taken during the 2000 monitoring study. The results of these steps are discussed in the following section.

6.1 PRECISION

Sample triplicates were employed for metals at three of the monitoring stations (Charcot, Kelley Park, and Singleton) in this study as measures of precision. Precision in this study as defined in the project QAPP document is determined by the “tightness” of individual triplicate values. This tightness, or precision, is evaluated by calculating the relative percent difference (RPD). The RPD is classically calculated by taking the difference between two values, dividing that difference by the mean of the two values and multiplying by 100% (Equation 1). This study, however, used triplicates instead of duplicates and a modified version of the RPD equation was required. This modified RPD equation divides the range of the triplicate values by their mean and then multiplies the quotient by 100% (Equation 2).

(Equation 1) $[(X_1-X_2)/(X_1+X_2)/2] \text{ x } 100\%$

where,
X_1 = highest value and X_2 = lowest value.

(Equation 2) $[(X_1-X_3)/(X_1+X_2+X_3)/3] \text{ x } 100\%$

where,
X_1 = highest value, X_2 = middle value, and X_3 = lowest value.

The limit for metals precision as defined in the QAPP is 25%. Since triplicate samples collected for this study were discrete samples collected serially from the same location (*i.e.*, not aliquots drawn from a common sample), RPD values up to 50% were considered acceptable.

The 1999 monitoring report indicated that RPD values exceeded 100% three times, ranging from 104 – 248%. Sample contamination was suspected and corrective actions recommended. These corrective actions were implemented in the 2000 monitoring study.

The corrective actions recommended in the 1999 report appear to have been successful in reducing the RPD values calculated form the 2000 data. All sample triplicates collected during the 2000 monitoring event had RPD values <50% and were considered acceptable.

6.2 DISSOLVED VS. TOTAL METAL CONCENTRATIONS

The 1999 monitoring report indicated that there were 23 instances of dissolved metal concentrations being greater than the total metal concentrations. By definition, dissolved concentrations are less than, or equal to total metal concentrations. It should be noted, that because of the low concentrations of metals being measured and the range of precision of the analytical method, dissolved values could potentially be greater than total concentrations. The method quality control limit for metals analyses indicates that the dissolved metal concentration must be ≤ 125% of the total concentration. Based on this finding, samples having dissolved concentrations > 125% of total concentrations were considered contaminated and therefore unacceptable.

This acceptability criterion was applied to the data collected during the 2000 monitoring event. Results from the 2000 monitoring study indicate that there were 20 instances of dissolved concentrations exceeding total concentrations, with selenium being the most prevalent (Table 6-1). Almost 50 percent (8 of 20) fail to meet the 125% criterion and were, therefore excluded from analyses.

Table 6-1
Summary of Dissolved vs Total Metals Inversions

Station	Month	Metal	Total (µg/l)	Dissolved (µg/l)	Percent Difference
Charcot	July	Selenium	2.0	2.4	120
Watson Park Downstream	September	Selenium	2.7	2.8	104
	October	Copper	2.8	3.6	**128**
	November	Selenium	2.0	2.1	105
San Miguelita	June	Nickel	3.0	3.2	107
	August	Selenium	2.7	2.8	104
	September	Selenium	2.6	2.9	111
	November	Selenium	3.1	3.2	103
Fleamarket/ Muni Golf	July	Selenium	1.8	2.8	**156**
Kelley Park	September	Selenium	0.8	1.0	125
Stonegate	June	Arsenic	2.4	2.5	104
Singleton	May	Selenium	0.3	0.4	**133**
Hellyer	July	Selenium	0.2	0.3	**150**
	November	Copper	1.0	2.7	**270**
		Nickel	3.1	6.7	**216**
		Selenium	0.2	0.7	**350**
TPS	May	Copper	4.5	4.8	107
	June	Nickel	8.0	8.9	111
	October	Nickel	8.0	9.0	112
	November	Selenium	0.7	1.2	**171**

SECTION 7.0
CONCLUSIONS AND RECOMMENDATIONS

This preliminary study to determine the background water quality characteristics for Coyote Creek confirmed the results that were described in the 1999 monitoring report (Tetra Tech, 2000) and previous studies. In those studies, water quality in Coyote Creek was found to be degraded because of high temperatures and elevated levels of nutrients and pathogens. The current study found two primary areas (temperature and pathogens) of concern. Comparisons of the Coyote Creek water quality characteristics to those of the recycled water indicated that releasing recycled water into the creek would most likely reduce the concentrations of metals and pathogens. Cooling the recycled water prior to release will obviously reduce the temperature locally. The nutrient concentrations in the recycled water, while elevated with respect to background nutrient concentrations, are not expected to affect algal and plant growth. This is because creek nutrient concentrations are already saturated and no nuisance algal blooms have been observed to occur as a result.

This baseline study has demonstrated that the overall water quality of Coyote Creek would benefit from the release of recycled water to the creek.

Temperature - While there are no existing water quality criteria for temperature in ambient waters, one of the beneficial uses of Coyote Creek is to encourage the return of salmonid fish species. This requires that the water quality meet the biological needs of a cold-water fishery. Current CDFG guidelines indicate that the ambient temperatures of the water in Coyote Creek are too high to sustain a cold-water fishery. One of the requirements of releasing recycled water into the creek is that it be artificially cooled to meet CDFG guidelines prior to release. The continuously monitored water temperatures collected from sites along the creek, in conjunction with the air temperature data, will provide data appropriate to complete the final design specifications for the cooling and chilling equipment.

Pathogens - Pathogen concentrations along the creek were exceedingly high, with concentrations of total coliform being as high as several orders of magnitude greater than the lowest applicable criterion. Local land-use characteristics will need to be identified before any definitive conclusions as to the cause of the elevated pathogen levels in the creek can be made. Release of recycled water into the creek will flush existing pathogens downstream and out of the creek. Continued release of recycled water into the creek may provide the dilution necessary to keep pathogen concentrations under control.

Metals - There we no metals exceedances during the Summer 2000 Monitoring program.

Nutrients - Nutrient concentrations in the creek were generally much lower than those in the recycled water. There was no apparent evidence of nuisance algal blooms occurring in the creek even though nutrient concentrations were elevated enough to saturate the requirements of the predominant algae living in the creek (Dr. Rhea Williamson 2001). This indicates that nutrients are not the factors that are responsible for limiting algal and plant growth in Coyote Creek and that releasing recycled water into the creek is not expected to result in nuisance algal blooms.

Anions - The concentration of measured anions measured in the creek samples were consistent with those found in other creeks of the region. The concentration of anions in the recycled water was elevated with respect to background creek levels. Further study is needed to assess the impact that increased anions may have on the creek.

Chronic Toxicity - Chronic toxicity bioassays using the waterflea, *Ceriodaphnia dubia* indicated that neither the creek samples nor the recycled water samples contained any lethal (survival) or non-lethal (reproductive) toxicity.

Summary - The overall water quality and toxicity assessment of Coyote Creek and its two main tributaries during the 2000 monitoring season determined that Coyote Creek is an impaired waterbody. This impairment is the result of elevated temperatures and extremely high pathogen levels. And, as such, the creek would not meet beneficial use criteria as specified by the CDFG for a cold-water fishery or the Basin Plan for human contact. Releasing chilled, recycled water into the creek would lower local creek temperatures and dilute pathogen and metal concentrations, resulting in overall habitat improvement.

7.1 RECOMMENDATIONS

This study confirmed the results reported in previous assessments of Coyote Creek as mentioned earlier in this document. As such, any recommendations would be designed to fine-tune additional monitoring efforts and to address some concerns that have arisen regarding elevated ion concentrations in the recycled water. The following section presents water quality parameters that should be included in any future monitoring efforts as well as those that have proven themselves to be not necessary. It should be noted however, that if either the baseline creek or recycled water quality changes, additional parameters could be added to the monitoring program.

Additional Parameters to Monitor - The monitoring results indicate that concentrations of certain anions (*e.g.*, chloride, alkalinity) and metalloid cations (*e.g.*, sodium) in the recycled water are elevated with respect to background creek levels. In some cases, depending upon the carbonate concentration of the water, these ions can be detrimental to soil permeability, resulting in habitat degradation. Because of this, these anions, as well as carbonate and bicarbonate should be included in any future monitoring efforts. These data could then be used to calculate the sodium adsorption ratio (SAR), which is a measure of soil permeability.

Parameters That Should Be Deleted From Routine Monitoring - While metals are toxicologically important, there has been no indication that they are present in Coyote Creek in concentrations that pose any threat to the beneficial uses of either the creek or the Lower South San Francisco Bay. As such, they could be removed from the list of parameters to be measured in any future monitoring program in Coyote Creek.

SECTION 8.0
REFERENCES

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APPENDIX

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot Metals

Date	Ag (ug/L) Total	Ag (ug/L) Dissolved	As (ug/L) Total	As (ug/L) Dissolved	Cd (ug/L) Total	Cd (ug/L) Dissolved	T. Cr (ug/L) Total	T. Cr (ug/L) Dissolved	Cu (ug/L) Total	Cu (ug/L) Dissolved
May(a)	<0.1	<0.05	2.3	2.2	<0.2	<0.1	2.6	0.8	3.0	1.4
May(b)	0.2	0.1	2.3	2.2	<0.2	<0.1	2.1	0.6	3.0	2.0
May(c)	<0.1	<0.05	2.4	2.2	<0.2	0.1	3.1	<0.5	2.9	1.4
June	1.0	0.1	2.6	2.3	<0.5	0.2	6.5	<0.5	3.7	2.2
July	<0.1	<0.05	2.9	2.4	0.2	0.1	3.4	<0.5	5.2	1.8
August	<0.05	<0.05	2.5	2.2	0.1	<0.1	2.3	<0.5	3.4	1.5
September	<0.1	<0.1	2.3	1.9	<0.2	<0.2	2.8	<0.5	3.9	1.7
October	<1.0	<1.0	2.3	2.1	<0.5	<0.5	2.6	<0.5	3.7	0.9
November	<1.0	<1.0	2.2	2.1	<0.2	<0.2	1.6	<0.5	2.2	1.1
Median	0.6	0.1	2.3	2.2	0.2	0.1	2.6	0.7	3.4	1.5
Maximum	1.0	0.1	2.6	2.3	0.2	0.2	6.5	0.8	5.2	2.2
Minimum	0.2	0.1	2.2	1.9	0.1	0.1	1.6	0.6	2.2	0.9
Mean	0.6	0.1	2.4	2.2	0.2	0.1	2.9	0.7	3.4	1.6
Number	2	2	8	8	2	3	8	2	9	9
Standard Deviation	1	0.0	0.1	0.1	0.1	0.0	2	0.2	1	0.4

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	Total	Methyl	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
May(a)	0.005	0.195	6.7	1.8	1.2	<0.5	2.1	2.0	10.8
May(b)	0.005	na	5.2	2.4	1.2	<0.5	2.1	2.1	10.5
May(c)	0.004	na	5.2	1.6	1.2	<0.5	2.1	2.1	10.0
June	na	0.229	6	3.7	2.0	<0.5	1.8	1.7	<10.0
July	0.007	na	7.0	2.1	2.5	<0.5	2.0	2.4	13.1
August	0.006	na	6	1.8	1.6	<0.5	1.9	1.8	29.0
September	0.007	<0.023	4.34	1.1	2.0	<0.5	1.9	2.1	10.6
October	0.007	0.096	3.76	<0.5	1.9	<0.5	1.5	1.3	9.0
November	0.004	0.074	3.65	0.9	1.3	<0.5	1.5	1.3	8.8
Median	0.005	0.146	5.2	1.8	1.5	na	1.9	2.0	11
Maximum	0.007	0.229	6.7	3.7	2.0	na	2.1	2.4	29
Minimum	0.004	0.074	3.7	0.9	1.2	na	1.5	1.3	9
Mean	0.005	0.149	5.1	1.9	1.6	na	1.9	1.9	13
Number	7	4	8.0	8	8	na	9	9	7
Standard Deviation	0.001	0.1	1.1	1	0.4	na	0.3	0.4	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May(a)	na	na	na	na	na	na	na	na
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	61.5	na	56.5	na	na	na
August	na	na	60.0	na	54.6	na	375	na
September	na	na	63.8	58.8	54.3	52.9	383	na
October	na	na	55.0	na	47.8	na	334	360
November	111	na	65.7	na	53.9	na	386	390
Median	111	na	61.9	58.8	54.1	52.9	379	375
Maximum	111	na	65.7	58.8	54.6	52.9	386	390
Minimum	111	na	55.0	58.8	47.8	52.9	334	360
Mean	111	na	61.1	58.8	52.7	52.9	369	375
Number	1	0	4	1	4	1	4	2
Standard Deviation	na	na	5	na	3	na	24	21

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho- PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May(a)	106	<1.0	0.05	0.49	3.8	149	<0.1	0.003
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	0.09	0.15	na	na	<0.1	0.003
July	na	na	0.11	0.12	2.9	119	<1.0	0.039
August	na	na	na	na	na	na	<0.1	0.003
September	na	na	0.09	0.11	3.0	na	0.4	0.012
October	77	1.5	0.11	0.18	2.5	93	<0.1	0.002
November	79	<1.0	0.11	0.08	2.9	106	<0.1	0.001
Median	79	1.5	0.10	0.14	2.9	113	0.4	0.003
Maximum	106	1.5	0.11	0.49	3.8	149	0.4	0.039
Minimum	77	1.5	0.05	0.08	2.5	93	0.4	0.001
Mean	87	1.5	0.09	0.19	3.0	117	0.4	0.009
Number	3	1	6	6	5	4	1	7
Standard Deviation	16	na	0.0	0.2	0.5	24	na	0.0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May(a)	na	18.0	8.5	8.00	1	1370	1374	<2
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	21.6	18.4	8.7	8.00	1	1130	1129	<2
July	20.0	20.0	8.0	8.00	na	1180	1185	<2
August	16.9	21.7	na	7.86	na	1160	na	<2
September	20.8	18.5	8.3	7.92	0.5	1100	1124	<2
October	18.7	18.0	8.4	7.80	na	1070	1050	4
November	11.2	13.9	9.2	7.44	na	1190	1160	<2
Median	19.35	18.4	8.45	7.92	1	1160	1145	4
Maximum	21.6	21.7	9.15	8	1	1370	1374	4
Minimum	11.2	13.9	8	7.44	0.5	1070	1050	4
Mean	18.2	18.4	8.5	7.9	0.8	1171	1170	4
Number	6	7	6	7	3	7	6	1
Standard Deviation	3.8	2.4	0.4	0.2	na	97.5	109.7	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May(a)	26	850	3.6	4.2
May(b)	na	na	na	na
May(c)	na	na	na	na
June	na	690	2.5	2.9
July	35	600	3.1	3.3
August	26	700	2.9	3.3
September	35	680	2.7	3.5
October	27	640	3.0	4.2
November	14	700	2.7	2.8
Median	27	690	2.9	3.3
Maximum	35	850	3.6	4.2
Minimum	14	600	2.5	2.8
Mean	27	694	2.9	3.5
Number	6	7	7	7
Std. Dev	8	78	0.4	0.6

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Charcot Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May(a)	12,375	920	165	<0.1	<0.1
				5	
May(b)	na	na	na	na	na
May(c)	na	na	na	na	na
June	10	1017	340	<0.1	<0.1
				0.3	0.2
July	35,500	3300	380	0.2	0.2
August	na	na	na	<0.1	<0.1
				0.4	0.1
September	18,000	320	410	<0.1	0.25
October	15,000	1,100	630	0.4	0.7
November	13,000	270	200	0.4	<0.1
Median	14000	969	360	0.4	0.2
Maximum	35500	3300	630	5.0	0.7
Minimum	10	270	165	0.2	0.1
Mean	15648	1155	354	1.1	0.3
Number	6	6	6	6.0	5.0
Standard Deviation	11509	1110	167	1.9	0.2

Coyote Creek Dry Weather Season Sampling Results

Charcot Pesticides

Date	Chlorpyrifos (ug/l)	Diazinon (ug/l)	Malathion (ug/l)
May(a)	na	na	na
May(b)	na	na	na
May(c)	na	na	na
June	na	na	na
July	<0.2	<0.2	<0.2
August	na	na	na
September	na	na	na
October	na	na	na
November	na	na	na
Median	na	na	na
Maximum	na	na	na
Minimum	na	na	na
Mean	na	na	na
Number	na	na	na
Standard Deviation	na	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf Metals

Date	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	<0.05	2.5	2.5	<0.2	0.1	2.1	<0.5	2.7	1.5
June	<1.0	<0.05	2.6	2.2	<0.5	0.1	5.1	<0.5	3.6	2.3
July	<0.1	<0.05	2.9	2.4	<0.2	<0.1	3.1	<0.5	5.1	2.0
August	<0.05	<0.05	2.5	2.1	<0.1	<0.1	2.4	<0.5	3.1	2.3
September	<0.1	<0.1	2.4	2.0	<0.2	<0.2	2.4	<0.5	3.5	1.6
October	<1.0	<1.0	2.4	1.9	<0.5	<0.5	2.5	<0.5	3.2	1.7
November	<1.0	<1.0	2.4	1.9	<0.2	<0.2	2.0	<0.5	2.5	<1.0
Median	na	na	2.5	2.1	na	0.1	2.4	na	3.2	1.8
Maximum	na	na	2.6	2.5	na	0.1	5.1	na	5.1	2.3
Minimum	na	na	2.4	1.9	na	0.1	2.0	na	2.5	1.5
Mean	na	na	2.5	2.1	na	0.1	2.7	na	3.4	1.9
Number	na	na	6	6	na	2	6	na	7	6
Standard Deviation	na	na	0.1	0.2	na	0.0	1	na	1	0.4

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf Metals (cont'd)

Date	Hg (ug/L) Total	Hg (ng/L) Methyl	Ni (ug/L) Total	Ni (ug/L) Dissolved	Pb (ug/L) Total	Pb (ug/L) Dissolved	Se (ug/L) Total	Se (ug/L) Dissolved	Zn (ug/L) Total
May	0.007	na	4.8	1.8	1.2	<0.5	2.1	2.1	27.1
June	0.007	na	6.0	3.2	2.0	<0.5	1.7	1.7	11.0
July	0.006	na	6.9	2.0	2.7	<0.5	1.8*	2.8*	13.8
August	0.005	na	6.0	2.1	1.9	<0.5	2.2	1.8	28.0
September	0.006	na	4.2	0.9	1.8	<0.5	2.1	1.5	8.3
October	0.007	na	2.8	<0.5	1.8	<0.5	1.6	1.5	8.8
November	0.006	na	3.5	2.0	1.7	<0.5	1.5	1.4	8.8
Median	0.007	na	4.5	2.0	1.8	na	1.9	1.6	9.9
Maximum	0.007	na	6.0	3.2	2.0	na	2.2	2.1	28.0
Minimum	0.005	na	2.8	0.9	1.2	na	1.5	1.4	8.3
Mean	0.006	na	4.6	2.0	1.7	na	1.9	1.7	15.3
Number	6	na	6	6	6	na	6	6	6
Standard Deviation	0.00	na	1	1	0.3	na	0.3	0.3	10

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of $\leq$ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	57.0	na	52.8	na	na	na
August	na	na	60.8	na	55.5	na	380	na
September	na	na	60.5	56.6	52.1	51.3	366	na
October	na	na	59.1	na	50.8	na	357	370
November	112	na	64.1	na	53.0	na	378	380
Median	112	na	60.7	56.6	52.55	51.3	372	375
Maximum	112	na	64.1	56.6	55.5	51.3	380	380
Minimum	112	na	59.1	56.6	50.8	51.3	357	370
Mean	112	na	61.1	56.6	52.85	51.3	370	375
Number	1	na	4	1	4	1	4	2
Standard Deviation	na	na	2	na	2	na	11	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	105	<1.0	0.05	0.17	3.8	146	0.1	0.003
June	na	na	0.09	0.15	na	na	<0.1	0.003
July	na	na	0.10	0.10	2.3	92	<1.0	0.032
August	na	na	na	na	na	na	<0.1	0.003
September	na	na	0.09	0.17	3.0	na	0.4	0.010
October	80	<1.0	0.10	0.18	2.9	100	<0.1	0.002
November	80	<1.0	0.11	0.13	3.2	106	<0.1	0.001
Median	80	na	0.10	0.16	3.0	103	0.3	0.003
Maximum	105	na	0.11	0.18	3.8	146	0.4	0.032
Minimum	80	na	0.05	0.10	2.3	92	0.1	0.001
Mean	88	na	0.09	0.15	3.0	111	0.3	0.008
Number	3	na	6	6	5	4	2	7
Standard Deviation	14	na	0.02	0.03	1	24	0.2	0.011

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May	na	18.9	8.3	7.90	na	1360	1354	<2
June	24.0	18.8	7.8	7.98	1	1070	1072	<2
July	19.7	20.4	7.9	7.90	na	1100	1097	<2
August	12.6	22.5	na	7.80	na	1150	na	<2
September	17.2	19.0	7.7	7.81	0.5	1070	1099	<2
October	17.7	18.4	7.6	7.82	na	1130	1118	5
November	14.4	13.3	8.6	7.36	na	1180	1157	<2
Median	17.5	18.9	7.9	7.82	0.8	1130	1109	5
Maximum	24.0	22.5	8.6	7.98	1.0	1360	1354	5
Minimum	12.6	13.3	7.6	7.36	0.5	1070	1072	5
Mean	17.6	18.8	8.0	7.80	0.8	1151	1150	5
Number	6	7	6	7	2	7	6	1
Standard Deviation	4	3	0.39	0.20	0.35	101	104	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	18	840	4.1	4.5
June	na	640	3.0	3.4
July	32	550	2.8	3.3
August	18	700	3.2	3.4
September	23	680	2.9	4.2
October	22	670	2.8	3.5
November	19	700	2.9	3.0
Median	20.5	680	2.9	3.4
Maximum	32	840	4.1	4.5
Minimum	18	550	2.8	3.0
Mean	22	683	3.1	3.6
Number	6	7	7	7
Std Dev.	5	87	0.5	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Fleamarket/Muni Golf Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	700,000	233,333	710	na	na
June	15,800	620	660	na	na
July	31,250	3,350	440	na	na
August	na	na	na	na	na
September	18,000	320	480	na	na
October	18,000	850	170	na	na
November	22,000	370	5,300	na	na
Median	20000	735	570	na	na
Maximum	700000	233333	5300	na	na
Minimum	15800	320	170	na	na
Mean	134175	39807	1293	na	na
Number	6	6	6	na	na
Standard Deviation	277251	94815	1972	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek Metals

Date	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	0.1	1.4	1.4	<0.2	<0.1	1.0	<0.5	4.0	2.9
June	<1.0	<0.05	1.9	1.7	<0.5	<0.1	1.3	<0.5	4.2	3.6
July	<0.1	<0.05	2.3	2.2	<0.2	<0.1	1.2	<0.5	15.1	4.7
August	<0.05	<0.05	2.0	1.9	<0.1	<0.1	1.0	<0.5	5.8	3.6
September	<0.1	<0.1	1.9	1.8	<0.2	<0.2	0.9	<0.5	6.4	3.8
October	<1.0	<1.0	1.9	1.6	<0.5	<0.5	1.7	<0.5	7.1	1.5
November	<1.0	<1.0	1.9	1.7	<0.2	<0.2	<0.5	<0.5	2.9	2.2
Median	na	0.1	1.9	1.7	na	na	1	na	5.0	3.6
Maximum	na	0.1	2	1.9	na	na	1.67	na	7.1	4.7
Minimum	na	0.1	1.4	1.4	na	na	0.9	na	2.9	1.5
Mean	na	0.1	1.8	1.7	na	na	1.2	na	5.1	3.2
Number	na	1	6	6	na	na	5	na	6	7
Standard Deviation	na	na	0.2	0.2	na	na	0.3	na	1.6	1.1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek Metals (cont'd)

Date	Hg (ug/L) Total	Hg (ng/L) Methyl	Ni (ug/L) Total	Ni (ug/L) Dissolved	Pb (ug/L) Total	Pb (ug/L) Dissolved	Se (ug/L) Total	Se (ug/L) Dissolved	Zn (ug/L) Total
May	0.002	na	4.8	0.9	<1.0	<0.5	0.4	0.4	<10.0
June	0.002	na	2.0	1.9	<1.0	<0.5	0.3	0.3	<10.0
July	<0.004	na	2.5	1.0	<1.0	<0.5	0.2	0.2	<10.0
August	<0.002	na	2.0	0.8	<0.5	<0.5	0.1	0.1	20.0
September	<0.002	na	1.6	1.1	<0.5	<0.5	0.2	0.1	5.0
October	0.004	na	2.9	1.4	0.7	<0.5	0.2	0.1	6.6
November	<0.002	na	1.1	<0.5	<0.5	<0.5	0.2	0.1	<5.0
Median	0.002	na	2.0	1.1	0.7	na	0.2	0.1	6.6
Maximum	0.004	na	4.8	1.9	0.7	na	0.4	0.4	20.0
Minimum	0.002	na	1.1	0.8	0.7	na	0.1	0.1	5.0
Mean	0.003	na	2.4	1.2	0.7	na	0.2	0.2	10.5
Number	3	na	6	6	1	na	7	7	3
Standard Deviation	0.001	na	1	0.4	na	na	0.1	0.1	8

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek Metals (cont'd)

	Na (mg/L)		Ca (mg/L)		Mg (mg/L)		Total Hardness	Alkalinity
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	(mg/L)	(mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	17.0	na	11.4	na	na	na
August	na	na	14.5	na	9.5	na	75	na
September	na	na	17.6	16.7	12.9	12.7	97	na
October	na	na	19.2	na	14.7	na	109	130
November	56.1	na	23.8	na	17.7	na	132	130
Median	56.1	na	18.4	16.7	13.8	12.7	103	130
Maximum	56.1	na	23.8	16.7	17.7	12.7	132	130
Minimum	56.1	na	14.5	16.7	9.5	12.7	75	130
Mean	56.1	na	18.8	16.7	13.7	13	103	130
Number	1	na	4	1	4	1	4	2
Standard Deviation	na	na	3.9	na	3	na	24	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	40	<1.0	0.01	0.17	0.4	115	<0.1	0.006
June	na	na	0.04	0.07	na	na	<0.1	0.007
July	na	na	0.07	0.05	0.1	25	<1.0	0.059
August	na	na	na	na	na	na	<0.1	0.003
September	na	na	0.08	0.12	<0.03	na	0.3	0.005
October	43	<1.0	0.03	0.09	0.1	26	<0.1	0.002
November	59	<1.0	<0.01	<0.01	0.2	43	<0.1	0.001
Median	43	<1.0	0.038	0.09	0.155	34.5	0.3	0.005
Maximum	59	<1.0	0.083	0.17	0.35	115.0	0.3	0.059
Minimum	40	<1.0	0.012	0.05	0.05	25.0	0.3	0.001
Mean	47	<1.0	0.047	0.10	0.18	52.3	0.3	0.012
Number	3	0	5	5	4	4	1	7.000
Standard Deviation	10	na	0.03	0.05	0.13	43	na	0.021

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Conductivity (umhos/cm) Field	BOD (mg/l)
May	na	16.7	9.9	8.30	0.75	730	726	<2
June	9.4	18.8	9.9	8.30	1	420	432	<2
July	9.4	19.5	8.2	8.20	na	320	317	<2
August	5.9	21.7	na	7.80	na	300	na	<2
September	7.5	18.3	9.5	7.70	0.5	350	355	<2
October	12.2	17.8	9.8	7.80	na	420	412	3
November	3.2	12.8	11.5	7.60	na	580	555	<2
Median	8.5	18.3	9.85	7.80	0.75	420	422	3
Maximum	12.2	21.7	11.5	8.30	1	730	726	3
Minimum	3.2	12.8	8.2	7.60	0.5	300	317	3
Mean	7.9	17.9	9.8	7.96	1	446	466	3
Number	6	7	6	7	3	7	6	1
Standard Deviation	3.1	2.8	1.1	0.3	na	156	151	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	9	450	3.6	3.6
June	na	250	3.0	3.5
July	16	<100	2.6	2.7
August	8	150	2.4	2.9
September	13	200	2.7	3.5
October	22	230	2.9	4.5
November	5	320	3.6	3.1
Median	11	240	2.9	3.5
Maximum	22	450	3.6	4.5
Minimum	5	150	2.4	2.7
Mean	12	267	3.0	3.4
Number	6	6	7	7
Std Dev.	6	106	0.5	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Upper Penitencia Creek Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	2,200	580	291	na	na
June	2,400	620	400	na	na
July	825	525	230	na	na
August	na	na	na	na	na
September	71,000	130	420	na	na
October	4,600	810	860	na	na
November	23,000	490	450	na	na
Median	3500	553	410	na	na
Maximum	71000	810	860	na	na
Minimum	825	130	230	na	na
Mean	17338	526	442	na	na
Number	6	6	6	na	na
Standard Deviation	27564	224	221	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Metals

Date	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	<0.05	2.3	2.4	<0.2	<0.1	2.1	<0.5	3.0	1.5
June	<1.0	0.1	2.5	2.2	<0.5	<0.1	3.6	<0.5	1.7	1.6
July	<0.1	<0.05	2.4	2.3	0.2	0.1	3.3	<0.5	3.8	1.2
August	<0.05	<0.05	2.6	2.1	<0.1	<0.1	2.2	<0.5	2.3	1.3
September	<0.1	<0.1	2.5	2.1	<0.2	<0.2	3.8	<0.5	3.3	1.0
October	<1.0	<1.0	2.2	1.9	<0.5	<0.5	3.0	<0.5	2.81*	3.63*
November	<1.0	<1.0	2.2	1.8	<0.2	<0.2	2.9	<0.5	2.6	<1.0
Median	na	0.1	2.4	2.1	0.2	0.1	2.9	na	2.8	1.3
Maximum	na	0.1	2.6	2.4	0.2	0.1	3.8	na	3.8	1.6
Minimum	na	0.1	2.2	1.8	0.2	0.1	2.1	na	1.7	1.0
Mean	na	0.1	2.4	2.1	0.2	0.1	2.9	na	2.8	1.3
Number	na	1	6	6	1	1.0	6.0	na	6.0	5
Standard Deviation	na	na	0	0	na	na	0.7	na	1	0

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of ≤ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	**Total**	**Methyl**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**
May	0.005	na	4.8	1.9	1.5	<0.5	2.6	2.5	13.6
June	0.006	na	6.0	3.8	2.0	<0.5	2.4	2.3	<10.0
July	0.006	na	7.1	2.3	3.0	<0.5	3	3.0	18.8
August	0.007	na	6.0	2.1	2.1	<0.5	2.6	2.4	43.0
September	0.010	na	5.8	0.9	3.3	<0.5	2.7	2.8	12.3
October	0.009	na	3.9	<0.5	2.9	<0.5	1.8	1.8	11.5
November	0.007	na	4.7	0.9	2.6	<0.5	2.0	2.1	10.5
Median	0.007	na	5.3	2.0	2.3	na	2.6	2.4	12.3
Maximum	0.010	na	6.0	3.8	3.3	na	2.8	3.0	43.0
Minimum	0.005	na	3.9	0.9	1.5	na	1.8	1.8	10.5
Mean	0.007	na	5.2	2.0	2.4	na	2.4	2.4	18.2
Number	6	na	6	6	6	na	7	7	5
Standard Deviation	0.002	na	1	1	1	na	0.4	0.4	14

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	68.2	na	62.2	na	na	na
August	na	na	69.6	na	61.4	na	427	na
September	na	na	51.0	69.7	44.0	63.9	309	na
October	na	na	67.1	na	59.0	na	411	440
November	127	na	72.2	na	60.7	na	430	430
Median	127	na	68.4	69.7	59.9	63.9	419	435
Maximum	127	na	72.2	69.7	61.4	63.9	430	440
Minimum	127	na	51.0	69.7	44.0	63.9	309	430
Mean	127	na	65.0	69.7	56.3	63.9	394	435
Number	1	na	4	1	4	1	4	2
Standard Deviation	na	na	10	na	8	na	58	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	114	<1.0	0.05	0.23	4.4	149	0.1	0.002
June	na	na	0.09	0.39	na	na	<0.1	0.004
July	na	na	0.11	0.11	3.7	133	<1.0	0.038
August	na	na	na	na	na	na	<0.1	0.001
September	na	na	<0.01	<0.01	4.2	na	0.3	0.006
October	76	<1.0	0.14	0.23	3.1	102	0.1	0.002
November	84	<1.0	0.12	0.16	3.8	121	<0.1	0.000
Median	84	na	0.11	0.23	3.8	127	0.1	0.002
Maximum	114	na	0.14	0.39	4.4	149	0.3	0.038
Minimum	76	na	0.05	0.11	3.1	102	0.1	0.000
Mean	91	na	0.10	0.22	3.8	126	0.2	0.007
Number	3	0	5	5	5	4	3	7
Standard Deviation	20	na	0.0	0.1	1	20	0	0.014

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May	na	17.7	7.5	7.80	1.5	1440	1445	<2
June	13.8	18.6	8.2	8.00	3	1440	1432	<2
July	24.1	19.5	8.0	8.00	na	1320	1311	<2
August	17.2	21.5	na	7.08	na	1290	na	<2
September	26.3	18.2	6.8	7.75	1	1300	1336	<2
October	23.7	17.7	6.4	7.70	na	1240	1228	4
November	18.6	13.8	7.0	7.30	na	1300	1275	<2
Median	21.2	18.2	7.3	7.75	2	1300	1324	4
Maximum	26.3	21.5	8.2	8.00	3	1440	1445	4
Minimum	13.8	13.8	6.4	7.08	1	1240	1228	4
Mean	20.6	18.1	7.3	7.66	2	1333	1338	4
Number	6	7	6	7	3	7	6	1
Standard Deviation	5	2	1	0	1	77	86	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	16	900	3.9	4.1
June	na	880	3.3	3.6
July	40	660	2.9	3.4
August	24	770	3.3	3.7
September	42	840	3.0	4.5
October	32	750	2.8	3.5
November	33	790	3.0	3.0
Median	33	790	3.0	3.6
Maximum	42	900	3.9	4.5
Minimum	16	660	2.8	3.0
Mean	31	799	3.2	3.7
Number	6	7	7	7
Std. Dev.	10	83	0	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	1,300,000	80,000	1,010	na	na
June	16,200	1,010	600	na	na
July	89,000	50,000	789	na	na
August	na	na	na	na	na
September	21,000	330	550	na	na
October	18,000	3,300	640	na	na
November	>80,000	>600	7,900	na	na
Median	21000	3300	715	na	na
Maximum	1300000	80000	7900	na	na
Minimum	16200	330	550	na	na
Mean	288840	26928	1915	na	na
Number	5	5	6	na	na
Standard Deviation	566084	36354	2937	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Downstream Pesticides

Date	Chlorpyrifos (ug/l)	Diazinon (ug/l)	Malathion (ug/l)
May	na	na	na
June	na	na	na
July	<0.2	<0.2	<0.2
August	na	na	na
September	na	na	na
October	na	na	na
November	na	na	na
Median	na	na	na
Maximum	na	na	na
Minimum	na	na	na
Mean	na	na	na
Number	na	na	na
Standard Deviation	na	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek Metals

	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	0.1	2.5	2.5	<0.2	0.1	1.7	0.5	2.2	1.9
June	<1.0	0.1	0.6	0.5	<0.5	0.1	1.6	<0.5	2.1	1.8
July	<0.1	<0.05	2.4	2.1	0.2	<0.1	2.7	<0.5	3.3	1.2
August	<0.05	<0.05	2.5	2.1	0.1	<0.1	2.7	<0.5	2.8	1.4
September	<0.1	<0.1	2.8	2.2	<0.2	<0.2	4.6	<0.5	3.9	1.0
October	<1.0	<1.0	2.5	2.1	<0.5	<0.5	3.7	<0.5	3.4	1.0
November	<1.0	<1.0	2.6	2.1	<0.2	<0.2	2.9	<0.5	2.5	<1.0
Median	na	0.1	2.5	2.1	0.2	0.1	2.8	0.5	2.8	1.3
Maximum	na	0.1	2.8	2.5	0.2	0.1	4.6	0.5	3.9	1.9
Minimum	na	0.1	0.6	0.5	0.1	0.1	1.6	0.5	2.1	1.0
Mean	na	0.1	2.3	1.9	0.2	0.1	2.9	0.5	2.9	1.4
Number	na	2	6	6	2	2	6	1	7	6
Standard Deviation	na	0.0	1	1	0.1	0.0	1	na	1	0.4

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek Metals (cont'd)

Date	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
	Total	Methyl	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
May	0.003	na	2.8	1.1	<1.0	<0.5	2.6	2.5	13.5
June	0.003	na	3.0	3.2	1.0	<0.5	2.7	2.7	<10.0
July	0.005	na	4.6	1.6	1.9	<0.5	2.8	2.8	34.1
August	0.008	na	5.0	1.3	2.3	<0.5	2.7	2.8	33.0
September	na	na	5.3	<0.5	3.0	<0.5	2.6	2.9	14.6
October	0.010	na	2.5	<0.5	2.5	<0.5	2.8	2.0	13.5
November	0.014	na	3.5	<0.5	2.1	<0.5	3.1	3.2	9.7
Median	0.007	na	3.3	1.5	2.3	na	2.7	2.8	13.5
Maximum	0.014	na	5.3	3.2	3.0	na	3.1	3.2	33.0
Minimum	0.003	na	2.5	1.1	1.0	na	2.6	2.0	9.7
Mean	0.007	na	3.7	1.8	2.2	na	2.8	2.7	16.9
Number	6	na	6	4	5	na	7	7	5
Standard Deviation	0.0	na	1	1	1	na	0.2	0.4	9

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	86.4	na	67.1	na	na	na
August	na	na	84.6	na	65.9	na	483	na
September	na	na	90.7	84.0	71.2	68.6	520	na
October	na	na	84.8	na	65.5	na	482	530
November	179	na	90.2	na	68.8	na	509	520
Median	179	na	87.5	84.0	67.4	68.6	496	525
Maximum	179	na	90.7	84.0	71.2	68.6	520	530
Minimum	179	na	84.6	84.0	65.5	68.6	482	520
Mean	179	na	87.6	84.0	67.9	68.6	498	525
Number	1	na	4	1	4	1	4	2
Standard Deviation	na	na	3	na	3	na	19	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	152	<1.0	0.05	0.19	6.7	193	0.1	0.005
June	na	na	0.06	0.22	na	na	<0.1	0.006
July	na	na	0.09	0.09	6.4	176	<1.0	0.048
August	na	na	na	na	na	na	<0.1	0.003
September	na	na	0.11	0.16	6.8	na	0.3	0.010
October	131	<1.0	0.15	<1.0	6.4	159	<0.1	0.003
November	127	<1.0	0.11	0.10	6.7	167	<0.1	0.001
Median	131	na	0.10	0.16	6.7	172	0.2	0.005
Maximum	152	na	0.15	0.22	6.8	193	0.3	0.048
Minimum	127	na	0.05	0.09	6.4	159	0.1	0.001
Mean	137	na	0.10	0.15	6.6	174	0.2	0.011
Number	3	na	6	5	5	4	2	7.000
Standard Deviation	13	na	0.0	0.1	0.2	15	0.1	0.017

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm)		BOD (mg/l)
						Lab	Field	
May	na	18.7	10.0	8.10	1	1700	1705	<2
June	8.5	19.0	11.3	8.20	1	1690	1680	<2
July	23.7	19.7	8.1	8.10	na	1640	1623	<2
August	20.9	21.6	na	7.88	na	1610	na	<2
September	37.1	18.8	8.8	7.95	1	1580	1618	<2
October	32.0	17.8	9.2	7.90	na	1620	1593	6
November	23.9	14.1	10.0	7.70	na	1600	1623	<2
Median	23.8	18.8	9.6	7.95	1	1620	1623	6
Maximum	37.1	21.6	11.3	8.20	1	1700	1705	6
Minimum	8.5	14.1	8.1	7.70	1	1580	1593	6
Mean	24.4	18.5	9.6	7.98	1	1634	1640	6
Number	6	7	6	7	3	7	6	1
Standard Deviation	10	2	1	0.2	0.0	45	43	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	8	1100	3.6	9.3
June	na	1040	2.1	2.2
July	30	860	2.5	2.7
August	30	970	2.6	3.4
September	59	1060	2.7	3.5
October	46	1000	2.4	3.6
November	47	1030	2.1	2.5
Median	38	1030	2.5	3.4
Maximum	59	1100	3.6	9.3
Minimum	8	860	2.1	2.2
Mean	37	1009	2.6	3.9
Number	6	7	7	7
Std Dev.	18	78	1	2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

San Miguelita Creek Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	1,350,000	100,000	860	na	na
June	15,800	630	460	na	na
July	24,000	1,750	553	na	na
August	na	na	na	na	na
September	15,000	530	510	na	na
October	14,000	4,000	700	na	na
November	26,000	1,800	1,600	na	na
Median	19900	1775	626.5	na	na
Maximum	1350000	100000	1600	na	na
Minimum	14000	530	460	na	na
Mean	240800	18118	781	na	na
Number	6	6	6	na	na
Standard Deviation	543418	40133	427	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream Metals

Date	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	<0.05	2.6	2.5	<0.2	<0.1	3.0	1.4	3.0	1.2
June	<1.0	0.1	3.0	2.5	<0.5	<0.1	5.6	<0.5	2.5	1.6
July	<0.1	<0.05	2.8	2.5	<0.2	<0.1	3.2	<0.5	2.9	1.2
August	<0.05	<0.05	2.6	2.1	<0.1	<0.1	2.9	<0.5	2.6	1.0
September	<0.1	<0.1	2.1	2.0	<0.2	<0.2	2.7	<0.5	2.5	0.9
October	<1.0	<1.0	2.1	1.9	<0.5	<0.5	2.1	<0.5	2.0	0.7
November	<1.0	<1.0	1.9	1.6	<0.2	<0.2	1.9	<0.5	1.9	<1.0
Median	na	0.1	2.4	2.1	na	na	2.8	1.4	2.5	1.1
Maximum	na	0.1	3.0	2.5	na	na	5.6	1.4	3.0	1.6
Minimum	na	0.1	1.9	1.6	na	na	1.9	1.4	1.9	0.7
Mean	na	0.1	2.4	2.1	na	na	3.0	1.4	2.5	1.1
Number	na	1	6	6	na	na	6	1	7	6
Standard Deviation	na	na	0	0	na	na	1	na	0	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream Metals (cont'd)

Date	Hg (ug/L) Total	Hg (ng/L) Methyl	Ni (ug/L) Total	Ni (ug/L) Dissolved	Pb (ug/L) Total	Pb (ug/L) Dissolved	Se (ug/L) Total	Se (ug/L) Dissolved	Zn (ug/L) Total
May	0.008	na	7.5	2.7	2.0	<0.5	2.5	2.4	14.0
June	0.015	na	11.0	4.8	5.0	<0.5	2.7	2.6	15.0
July	0.007	na	8.2	2.9	3.0	<0.5	2.6	2.6	12.4
August	0.010	na	8.0	2.6	3.2	<0.5	2.2	2.2	27.0
September	na	na	7.1	2.0	3.0	<0.5	0.2	2.6	9.1
October	0.008	na	3.9	0.8	2.1	<0.5	2.3	2.2	7.3
November	0.007	na	4.5	1.6	2.1	<0.5	1.5	1.5	8.1
Median	0.008	na	7.3	2.6	2.6	na	2.3	2.4	11.6
Maximum	0.015	na	11.0	4.8	5.0	na	2.7	2.6	27.0
Minimum	0.007	na	3.9	0.8	2.0	na	0.2	1.5	7.3
Mean	0.010	na	7.0	2.5	2.9	na	2.0	2.3	13.4
Number	5	na	6	7	6	na	7	7	6
Standard Deviation	0	na	3	1	1	na	1	0	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	53.0	na	58.2	na	na	na
August	na	na	53.7	na	55.7	na	363	na
September	na	na	55.7	52.1	58.5	57.5	380	na
October	na	na	51.0	na	52.3	na	343	360
November	70.5	na	53.0	na	52.0	na	347	340
Median	70.5	na	53.4	52.1	54.0	57.5	355	350
Maximum	70.5	na	55.7	52.1	58.5	57.5	380	360
Minimum	70.5	na	51.0	52.1	52.0	57.5	343	340
Mean	70.5	na	53.4	52.1	54.6	57.5	358	350
Number	1	na	4	1	4	1	4	2
Standard Deviation	na	na	2	na	3	na	17	14

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	73	<1.0	0.05	0.62	2.0	103	<0.1	0.001
June	na	na	0.12	0.48	na	na	<0.1	0.002
July	na	na	0.12	0.13	1.2	95	<1.0	0.019
August	na	na	na	na	na	na	<0.1	0.001
September	na	na	0.10	0.15	1.3	na	0.1	0.001
October	3.3	<1.0	0.13	0.18	0.1	6	0.1	0.001
November	45	<1.0	0.12	0.14	1.1	75	<0.1	0.000
Median	59	na	0.12	0.17	1.2	85	0.1	0.001
Maximum	73	na	0.13	0.62	2.0	103	0.1	0.019
Minimum	45	na	0.05	0.13	0.1	6	0.1	0.000
Mean	59	na	0.11	0.28	1.1	70	0.1	0.004
Number	2	na	6	6	5	4	2	7.000
Standard Deviation	20	na	0	0	1	44	0	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Conductivity (umhos/cm) Field	BOD (mg/l)
May	na	17.0	6.5	7.60	1	1140	1143	<2
June	22.7	18.3	5.4	7.70	2.5	1120	1119	2
July	14.2	19.5	7.7	7.70	na	1020	1012	<2
August	13.4	21.5	na	7.45	na	950	na	<2
September	14.8	18.1	4.5	7.41	1	960	987	<2
October	11.6	17.9	4.3	7.40	na	940	923	4
November	9.1	13.7	4.2	6.90	na	920	908	<2
Median	13.8	18.1	5.0	7.45	1	960	1000	3
Maximum	22.7	21.5	7.7	7.70	2.5	1140	1143	4
Minimum	9.1	13.7	4.2	6.90	1	920	908	2
Mean	14.3	18.0	5.4	7.45	2	1007	1015	3
Number	6	7	6	7	3	7	6	2
Standard Deviation	5	2	1	0	1	90	98	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	14	690	4.5	4.7
June	na	660	4.2	5.9
July	21	540	3.6	4.2
August	19	560	3.7	4.5
September	22	620	3.8	4.7
October	14	560	3.2	3.8
November	13	550	3.2	3.8
Median	17	560	3.7	4.5
Maximum	22	690	4.5	5.9
Minimum	13	540	3.2	3.8
Mean	17	597	3.7	4.5
Number	6	7	7	7
Std. Dev.	4	60	0	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Watson Park Upstream Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	10,200	740	166	na	na
June	15,000	1,710	400	na	na
July	8,000,000	700,000	1,360	na	na
August	na	na	na	na	na
September	18,000	300	400	na	na
October	8,000	1,500	680	na	na
November	>80,000	>600	12,000	na	na
Median	15000	1500	540	na	na
Maximum	8000000	700000	12000	na	na
Minimum	8000	300	166	na	na
Mean	1610240	140850	2501	na	na
Number	5	5	6	na	na
Standard Deviation	3571987	312575	4672	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park Metals

Date	Ag (ug/L) Total	Ag (ug/L) Dissolved	As (ug/L) Total	As (ug/L) Dissolved	Cd (ug/L) Total	Cd (ug/L) Dissolved	T. Cr (ug/L) Total	T. Cr (ug/L) Dissolved	Cu (ug/L) Total	Cu (ug/L) Dissolved
May(a)	<1.0	<0.05	3.0	2.6	0.2	<0.1	4.9	0.6	3.8	1.6
May(b)	<1.0	0.1	2.7	2.5	<0.2	<0.1	4.4	0.9	4.1	1.4
May(c)	<1.0	<0.05	2.8	2.4	<0.2	<0.1	4.8	0.7	4.0	1.5
June	<1.0	0.1	2.8	2.2	0.5	0.2	5.5	<0.5	2.5	1.5
July	<0.1	<0.05	2.2	1.9	<0.2	<0.1	3.7	<0.5	3.4	1.1
August	<0.05	<0.05	2.3	2.0	<0.1	<0.1	3.1	<0.5	2.7	1.2
September	<0.1	<1.0	2.2	1.8	<0.2	<0.2	3.8	<0.5	3.0	1.2
October	<1.0	<1.0	1.8	1.5	<0.5	<0.5	5.2	<0.5	3.1	<1.0
November	<1.0	<1.0	2.1	1.6	<0.2	<0.2	<0.5	<0.5	<1.0	0.9
Median	na	0.1	2.5	2.1	0.4	0.2	4.8	0.7	3.3	1.3
Maximum	na	0.1	3.0	2.6	0.5	0.2	5.5	0.9	4.1	1.6
Minimum	na	0.1	1.8	1.5	0.2	0.2	3.1	0.6	2.5	0.9
Mean	na	0.1	2.5	2.1	0.4	0.2	4.5	0.7	3.3	1.3
Number	na	2	8	8	2	1	7	3	8	8
Standard Deviation	na	0.0	0.4	0.4	0.2	na	0.8	0.2	0.6	0.2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park Metals (cont'd)

Date	Hg (ug/L) Total	Hg (ng/L) Methyl	Ni (ug/L) Total	Ni (ug/L) Dissolved	Pb (ug/L) Total	Pb (ug/L) Dissolved	Se (ug/L) Total	Se (ug/L) Dissolved	Zn (ug/L) Total
May(a)	0.008	na	10.1	4.2	1.9	<0.5	1.3	1.3	12.7
May(b)	0.008	na	10.5	4.5	2.0	<0.5	1.3	1.4	14.3
May(c)	0.008	na	10.3	4.4	2.2	<0.5	1.3	1.3	14.0
June	0.012	na	9.0	3.5	3.0	<0.5	1.3	1.3	12.0
July	0.010	na	9.3	2.2	1.8	<0.5	1.4	1.1	11.5
August	0.010	na	7.3	2.1	1.8	<0.5	0.9	1.0	13.0
September	0.009	na	8.1	1.7	1.9	<0.5	0.8	1.0	11.2
October	0.010	na	10.0	1	3.0	<1.0	0.8	0.6	14.0
November	0.004	na	3.6	1.7	0.7	<0.5	0.9	0.9	6.0
Median	0.009	na	9.5	2.2	2.0	na	1.3	1.1	12.9
Maximum	0.012	na	10.5	4.5	3.0	na	1.4	1.4	14.3
Minimum	0.004	na	3.6	1.0	0.7	na	0.8	0.6	6.0
Mean	0.009	na	8.6	2.8	2.1	na	1.1	1.1	12.2
Number	8	na	8	9	8	na	9	9	8
Standard Deviation	0.0	na	2	1	1	na	0.3	0.2	3

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park Metals (cont'd)

	Na (mg/L)		Ca (mg/L)		Mg (mg/L)		Total Hardness	Alkalinity
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	(mg/L)	(mg/L)
May(a)	na	na	na	na	na	na	na	na
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	43.0	na	42.6	na	na	na
August	na	na	41.3	na	39.6	na	266	na
September	49.5	47.9	40.2	41.0	39.3	38.1	262	na
October	44.9	na	43.3	na	37.8	na	264	250
November	48.7	na	na	na	40.5	na	283	250
Median	48.7	47.9	41.3	41.0	39.5	38.1	265	250
Maximum	49.5	47.9	43.3	41.0	40.5	38.1	283	250
Minimum	44.9	47.9	40.2	41.0	37.8	38.1	262	250
Mean	47.7	47.9	41.6	41.0	39.3	38.1	269	250
Number	3	1	3	1	4	1	4	2
Standard Deviation	2	na	2	na	1	na	10	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May(a)	61	<1.0	0.03	0.24	1.4	74	<0.1	0.003
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	0.06	0.16	na	na	<0.1	0.001
July	na	na	0.05	0.08	0.5	44	<1.0	0.024
August	na	na	na	na	na	na	<0.1	0.002
September	na	na	0.07	0.09	0.9	na	<0.1	na
October	33	<1.0	0.07	0.16	0.9	56	<0.1	0.001
November	35	<1.0	0.04	0.11	1.2	57	<0.1	0.000
Median	35	na	0.06	0.14	0.9	57	na	0.001
Maximum	61	na	0.07	0.24	1.4	74	na	0.024
Minimum	33	na	0.03	0.08	0.5	44	na	0.000
Mean	43	na	0.05	0.14	1.0	58	na	0.005
Number	3	na	6	6	5	4	na	6
Standard Deviation	16	na	0.0	0.1	0.3	12	na	0.009

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May(a)	15.8	17.2	7.0	7.90	1	910	912	2
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	20.8	18.3	7.1	7.60	1	830	700	<2
July	16.6	19.9	6.2	7.79	na	730	666	<2
August	16.0	21.9	na	7.52	na	720	na	<2
September	18.5	18.7	6.7	na	na	690	815	<2
October	20.7	17.4	7.5	7.54	na	690	677	<2
November	7.0	12.5	8.1	7.10	na	740	723	<2
Median	16.6	18.3	7.1	7.57	1	730	712	2
Maximum	20.8	21.9	8.1	7.90	1	910	912	2
Minimum	7.0	12.5	6.2	7.10	1	690	666	2
Mean	16.5	18.0	7.1	7.58	1	759	749	2
Number	7	7	6	6	2	7	6	1
Standard Deviation	5	3	1	0.3	0	82	96	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May(a)	24	530	3.4	4.5
May(b)	na	na	na	na
May(c)	na	na	na	na
June	na	500	3.7	5.8
July	24	500	3.4	3.8
August	22	400	4.1	3.6
September	23	440	3.5	4.6
October	28	400	3.2	3.9
November	9	440	3.2	3.1
Median	24	440	3.4	3.9
Maximum	28	530	4.1	5.8
Minimum	9	400	3.2	3.1
Mean	22	459	3.5	4.2
Number	6	7	7	7
Std. Dev	7	52	0.3	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Kelley Park Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May(a)	16,000	433	297	na	na
May(b)	na	na	na	na	na
May(c)	na	na	na	na	na
June	20,750	880	710	na	na
July	71,000	2,767	367	na	na
August	na	na	na	na	na
September	24,000	400	220	na	na
October	20,000	700	330	na	na
November	180,000	9,500	1,300	na	na
Median	22375	790	349	na	na
Maximum	180000	9500	1300	na	na
Minimum	16000	400	220	na	na
Mean	55292	2447	537	na	na
Number	6	6	6	na	na
Standard Deviation	64437	3567	410	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate Metals

Date	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	<0.1	<0.05	3.1	2.8	<0.2	<0.1	5.5	0.9	3.2	1.4
June	<1.0	0.1	2.4	2.5	<0.5	<0.1	1.8	<0.5	2.3	1.2
July	<0.1	<0.05	2.3	1.9	<0.2	<0.1	3.8	<0.5	3.0	1.1
August	<0.05	<0.05	2.2	1.9	<0.1	<0.1	3.8	<0.5	2.7	1.2
September	<0.1	<0.1	2.1	1.7	<0.2	<0.2	5.3	<0.5	3.6	1.0
October	<1.0	<1.0	1.8	1.5	<0.5	<0.5	5.1	0.6	2.6	<1.0
November	<1.0	<1.0	1.6	1.4	<0.2	<0.2	2.1	<0.5	1.8	1.0
Median	na	0.1	2.2	1.8	na	na	4.5	0.8	2.7	1.1
Maximum	na	0.1	3.1	2.8	na	na	5.5	0.9	3.6	1.4
Minimum	na	0.1	1.6	1.4	na	na	1.8	0.6	1.8	1.0
Mean	na	0.1	2.2	2.0	na	na	3.9	0.8	2.7	1.1
Number	na	1	6	6	na	na	6	2	7	6
Standard Deviation	na	na	1	1	na	na	2	0.2	1	0.2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	Total	Methyl	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
May	0.006	na	12.1	3.7	1.2	<0.5	0.4	0.4	<10.0
June	0.006	na	8.0	2.9	3.0	<0.5	0.4	0.4	<10.0
July	0.009	na	10.7	2.2	1.5	<0.5	0.3	0.3	<10.0
August	0.006	na	8.7	2.0	1.4	<0.5	0.3	0.2	7.5
September	0.009	na	10.3	2.1	1.9	<0.5	0.3	0.3	9.7
October	0.011	na	10.0	3.0	2.0	<1.0	0.3	0.3	12.0
November	0.004	na	4.7	1.7	0.7	<0.5	0.2	0.2	<5.0
Median	0.006	na	9.4	2.2	1.6	na	0.3	0.3	9.7
Maximum	0.011	na	12.1	3.7	3.0	na	0.4	0.4	12.0
Minimum	0.004	na	4.7	1.7	0.7	na	0.2	0.2	7.5
Mean	0.007	na	9.0	2.5	1.7	na	0.3	0.3	9.7
Number	6	na	6	7	6	na	7	7	3
Standard Deviation	0.0	na	3	1	1	na	0.1	0.1	2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	36.4	na	31.3	na	na	na
August	na	na	35.2	na	29.4	na	209	na
September	33.3	30.9	38.2	36.7	32.4	29.7	229	na
October	30.4	na	37.7	na	30.0	na	217	200
November	31.2	na	41.2	na	31.8	na	234	200
Median	31.2	30.9	38.0	36.7	30.9	29.7	223	200
Maximum	33.3	30.9	41.2	36.7	32.4	29.7	234	200
Minimum	30.4	30.9	35.2	36.7	29.4	29.7	209	200
Mean	31.6	30.9	38.1	36.7	30.9	29.7	222	200
Number	3	1	4	1	4	1	4	2
Standard Deviation	1	na	2	na	1	na	11	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	46	<1.0	0.02	0.15	0.8	47	<0.1	0.005
June	na	na	0.04	0.15	na	na	<0.1	0.003
July	na	na	0.03	0.20	0.7	39	<1.0	0.039
August	na	na	na	na	na	na	<0.1	0.002
September	na	na	0.04	0.05	0.6	na	<0.1	na
October	23	<1.0	0.05	0.11	0.7	40	<0.1	0.001
November	26	<1.0	0.02	0.03	1.1	44	<0.1	0.000
Median	26	na	0.03	0.13	0.7	42	na	0.002
Maximum	46	na	0.05	0.20	1.1	47	na	0.039
Minimum	23	na	0.02	0.03	0.6	39	na	0.000
Mean	32	na	0.03	0.11	0.8	43	na	0.008
Number	3	na	6	6	5	4	na	6
Standard Deviation	13	na	0.0	0.1	0.2	4	na	0.015

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Conductivity (umhos/cm) Field	BOD (mg/l)
May	15.7	17.9	7.6	8.20	1.5	690	687	2
June	29.5	19.1	7.3	7.90	1	630	600	2
July	16.6	20.2	6.4	7.99	na	560	505	<2
August	18.4	22.6	na	7.60	na	530	na	<2
September	24.0	18.9	7.0	na	na	540	553	<2
October	19.7	17.7	7.7	7.62	na	570	550	<2
November	8.2	12.3	8.6	7.20	na	600	569	<2
Median	18.4	18.9	7.5	7.76	1.25	570	561	2
Maximum	29.5	22.6	8.6	8.20	1.5	690	687	2
Minimum	8.2	12.3	6.4	7.20	1	530	505	2
Mean	18.9	18.4	7.4	7.75	1	589	577	2
Number	7	7	6	6	2	7	6	2
Standard Deviation	7	3	1	0.4	0.4	56	62	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	20	400	3.5	3.9
June	na	370	4.0	4.5
July	23	380	3.2	3.8
August	35	300	3.5	3.7
September	30	320	3.3	3.8
October	29	330	2.8	3.5
November	10	340	3.0	10.6
Median	26	340	3.3	3.8
Maximum	35	400	4.0	10.6
Minimum	10	300	2.8	3.5
Mean	25	349	3.3	4.8
Number	6	7	7	7
Std Dev.	9	36	0.4	3

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Stonegate Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	3,100	130	123	na	na
June	8,200	490	520	na	na
July	2,400	220	75	na	na
August	na	na		na	na
September	12,000	580	210	na	na
October	430	210	120	na	na
November	<100	160	320	na	na
Median	3100	215	166.5	na	na
Maximum	12000	580	520	na	na
Minimum	430	130	75	na	na
Mean	5226	298	228	na	na
Number	5	6	6	na	na
Standard Deviation	4750	188	167	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton Metals

Date	Ag (ug/L) Total	Ag (ug/L) Dissolved	As (ug/L) Total	As (ug/L) Dissolved	Cd (ug/L) Total	Cd (ug/L) Dissolved	T. Cr (ug/L) Total	T. Cr (ug/L) Dissolved	Cu (ug/L) Total	Cu (ug/L) Dissolved
May(a)	<0.1	<0.05	2.8	2.7	<0.2	<0.1	5.4	1.0	3.4	1.9
May(b)	<0.1	<0.05	4.3	2.7	<0.2	<0.1	6.3	0.9	3.5	1.5
May(c)	<0.1	<0.05	2.9	2.7	<0.2	<0.1	6.0	1.0	3.9	1.4
June	<1.0	0.1	2.7	2.3	<0.5	<0.1	1.3	<0.5	1.5	1.3
July	<0.1	<0.05	2.3	1.9	<0.2	<0.1	2.1	<0.5	2.1	1.1
August	<0.05	<0.05	2.0	1.8	<0.1	<0.1	1.8	<0.5	3.4	1.3
September	<0.1	<0.1	2.1	1.9	<0.2	<0.2	3.0	<0.5	2.1	0.9
October	<1.0	<1.0	1.9	1.6	<0.5	<0.5	4.9	0.8	1.7	<1.0
November	<1.0	<1.0	1.0	0.9	<0.2	<0.2	1.5	0.8	1.2	0.8
Median	na	0.1	2.4	2.1	na	na	3.9	0.9	2.1	1.3
Maximum	na	0.1	4.3	2.7	na	na	6.3	1.0	3.9	1.9
Minimum	na	0.1	1.0	0.9	na	na	1.3	0.8	1.2	0.8
Mean	na	0.1	2.5	2.1	na	na	3.8	0.9	2.5	1.3
Number	na	1	8	8	na	na	8	5	9	8
Standard Deviation	na	na	1	1	na	na	2	0.1	1	0.3

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	**Total**	**Methyl**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**
May(a)	0.006	na	11.0	3.1	1.0	<0.5	0.338*	0.367*	<10.0
May(b)	0.007	na	10.5	3.4	1.1	<0.5	0.339*	0.375*	<10.0
May(c)	0.007	na	10.7	3.7	1.3	<0.5	0.342*	0.386*	<10.0
June	0.007	na	5.0	2.8	1.0	<0.5	0.3	0.3	<10.0
July	0.004	na	6.2	2.2	<1.0	<0.5	0.3	0.3	<10.0
August	0.005	na	5.7	2.0	0.8	<0.5	0.2	0.2	7.7
September	0.008	na	6.8	1.7	0.8	<0.5	0.3	0.2	<5.0
October	0.009	na	9.0	2.0	2.0	<1.0	0.3	na	21.0
November	0.003	na	3.7	1.1	<0.5	<0.5	0.2	0.2	<5.0
Median	0.007	na	7.9	2.2	1.0	na	0.3	0.2	14.4
Maximum	0.009	na	11.0	3.7	2.0	na	0.3	0.3	21.0
Minimum	0.003	na	3.7	1.1	0.8	na	0.2	0.2	7.7
Mean	0.007	na	7.8	2.5	1.1	na	0.3	0.2	14.4
Number	8	na	8	9	7	na	6	5	2
Standard Deviation	0.0	na	3	1	0.4	na	0.1	0.1	9

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of ≤ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton Metals (cont'd)

	Na (mg/L)		Ca (mg/L)		Mg (mg/L)		Total Hardness	Alkalinity
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	(mg/L)	(mg/L)
May(a)	na	na	na	na	na	na	na	na
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	36.3	na	31.8	na	na	na
August	na	na	37.2	na	31.2	na	221	na
September	35.8	33.1	36.3	35.2	33.8	31.3	230	na
October	33.3	na	37.1	na	31.8	na	223	210
November	26.2	na	41.3	na	27.4	na	216	190
Median	33.3	33.1	37.2	35.2	31.5	31.3	222	200
Maximum	35.8	33.1	41.3	35.2	33.8	31.3	230	210
Minimum	26.2	33.1	36.3	35.2	27.4	31.3	216	190
Mean	31.8	33.1	38.0	35.2	31.1	31.3	222	200
Number	3	1	4	1	4	1	4	2
Standard Deviation	5	na	2	na	3	na	6	14

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May(a)	45	<1.0	0.02	0.15	0.8	47	<0.1	0.008
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	na	na	<0.03	0.11	na	na	<0.1	0.003
July	na	na	0.02	0.02	7.0	86	<1.0	0.044
August	na	na	na	na	na	na	<0.1	0.003
September	na	na	0.02	0.04	0.5	na	<0.1	na
October	29	<1.0	0.04	0.12	0.7	45	<0.1	0.001
November	20	<1.0	<0.01	0.04	1.4	43	<0.1	0.000
Median	29	na	0.02	0.07	0.8	46	na	0.003
Maximum	45	na	0.04	0.15	7.0	86	na	0.044
Minimum	20	na	0.02	0.02	0.5	43	na	0.000
Mean	31	na	0.02	0.08	2.1	55	na	0.010
Number	3	na	4	6	5	4	na	6
Standard Deviation	13	na	0.0	0.1	3	21	na	0.0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May(a)	17.3	18.2	8.4	8.40	2	670	665	3
May(b)	na	na	na	na	na	na	na	na
May(c)	na	na	na	na	na	na	na	na
June	19.3	19.9	7.4	7.90	2	580	550	3
July	10.3	19.4	6.6	8.07	na	560	489	<2
August	11.2	23.1	na	7.71	na	540	na	<2
September	14.0	19.4	6.4	na	na	560	540	<2
October	15.2	17.9	7.3	7.52	na	590	550	<2
November	6.4	12.7	7.7	7.10	na	550	528	<2
Median	14	19.4	7.4	7.81	2	560	545	3
Maximum	19.3	23.1	8.4	8.40	2	670	665	3
Minimum	6.4	12.7	6.4	7.10	2	540	489	3
Mean	13.4	18.7	7.3	7.78	2	579	554	3
Number	7	7	6	6	2	7	6	2
Standard Deviation	4	3	1	0.5	0	44	59	0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May(a)	23	390	3.9	4.1
May(b)	na	na	na	na
May(c)	na	na	na	na
June	na	350	2.6	3.7
July	13	400	3.2	3.9
August	14	300	3.8	3.3
September	16	320	3.1	3.6
October	23	340	3.9	3.2
November	7	320	2.9	2.9
Median	15	340	3.2	3.6
Maximum	23	400	3.9	4.1
Minimum	7	300	2.6	2.9
Mean	16	346	3.3	3.5
Number	6	7	7	7
Std. Dev	6	37	1	0.4

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Singleton Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May(a)	780	260	124	<0.1	<0.1
				1	
May(b)	na	na	na	na	na
May(c)	na	na	na	na	na
June	1,386	200	140	na	na
July	1,250	83	75	<0.1	<0.1
				0.1	0.1
August	na	na	na	0.1	<0.1
September	1,700	190	140	<0.1	<0.1
October	180	140	80	<0.1	<0.1
November	2,000	60	180	0.9	0.1
Median	1318	165	132	0.5	0.1
Maximum	2000	260	180	1	0.1
Minimum	180	60	75	0.1	0.1
Mean	1216	156	123	1	0
Number	6	6	6	4	2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer Metals

Date	Ag (ug/L) Total	Ag (ug/L) Dissolved	As (ug/L) Total	As (ug/L) Dissolved	Cd (ug/L) Total	Cd (ug/L) Dissolved	T. Cr (ug/L) Total	T. Cr (ug/L) Dissolved	Cu (ug/L) Total	Cu (ug/L) Dissolved
May	<0.1	<0.05	1.6	1.4	<0.2	<0.1	3.6	<0.5	3.0	1.2
June (Riffle)	<1.0	0.1	1.7	1.4	<0.5	<0.1	1.4	<0.5	1.3	1.3
June (Pool)	<1.0	<0.05	1.7	1.4	<0.5	<0.1	0.7	<0.5	1.4	1.1
July	<0.1	<0.05	1.8	1.4	<0.2	<0.1	2.4	<0.5	2.0	1.2
August	<0.05	<0.05	1.4	1.3	<0.1	<0.1	2.0	<0.5	<2.0	1.0
September	<0.1	<0.1	1.3	1.2	<0.2	<0.2	2.5	<0.5	2.2	1.0
October	<1.0	<1.0	1.5	1.1	<0.5	<0.5	3.1	<0.5	1.3	<1.0
November	<1.0	<1.0	1.0	0.9	<0.2	<0.2	1.2	0.5	1.04*	2.66*
Median	na	0.1	1.5	1.3	na	na	2.0	0.5	1.7	1.2
Maximum	na	0.1	1.7	1.4	na	na	3.6	0.5	3.0	1.3
Minimum	na	0.1	1.0	0.9	na	na	0.7	0.5	1.3	1.0
Mean	na	0.1	1.5	1.2	na	na	2.1	0.5	1.9	1.1
Number	na	1	7	7	na	na	7	1	6	6
Standard Deviation	na	na	0.3	0.2	na	na	1	na	1	0

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of ≤ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	**Total**	**Methyl**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**
May	na	0.230	9.4	3.2	<1.0	<0.5	0.2	0.2	<10.0
June (Riffle)	0.006	0.143	5.0	2.5	1.0	<0.5	0.3	0.2	<10.0
June (Pool)	<0.002	na	5.0	3.0	1.0	<0.5	0.3	0.2	<10.0
July	0.007	na	7.1	1.9	<0.5	<0.5	0.2*	0.3*	<10.0
August	<0.010	na	5.3	1.5	0.6	<0.5	0.2	0.1	<5.0
September	0.008	0.048	6.3	1.2	0.7	<0.5	0.2	0.2	<5.0
October	0.009	0.077	6.0	1.0	1.0	<0.5	0.2	na	52.0
November	0.004	0.045	3.12*	6.7*	<0.5	<0.5	0.204*	0.652*	<5.0
Median	0.007	0.077	5.7	1.9	1.0	na	0.2	0.2	52.0
Maximum	0.009	0.230	9.4	3.2	1.0	na	0.3	0.2	52.0
Minimum	0.004	0.045	5.0	1.0	0.6	na	0.2	0.1	52.0
Mean	0.007	0.109	6.2	2.0	0.9	na	0.2	0.2	52.0
Number	4	5	6	7	5	na	6	5	1
Standard Deviation	0.0	0.1	2	1	0.2	na	0.04	0.1	na

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of $\leq$ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer Metals (cont'd)

	Na (mg/L)		Ca (mg/L)		Mg (mg/L)		Total Hardness	Alkalinity
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	(mg/L)	(mg/L)
May	na	na	na	na	na	na	na	na
June (Riffle)	na	na	na	na	na	na	na	na
June (Pool)	na	na	na	na	na	na	na	na
July	na	na	37.9	na	28.2	na	na	na
August	na	na	35.9	na	28.0	na	205	na
September	27.7	25.7	36.6	35.7	27.4	25.6	204	na
October	26.3	na	39.0	na	26.7	na	207	190
November	27.7	na	44.6	na	29.1	na	231	200
Median	27.7	25.7	37.8	35.7	27.7	25.6	206	195
Maximum	27.7	25.7	44.6	35.7	29.1	25.6	231	200
Minimum	26.3	25.7	35.9	35.7	26.7	25.6	204	190
Mean	27.2	25.7	39.0	35.7	27.8	25.6	212	195
Number	3	1	4	1	4	1	4	2
Standard Deviation	1	na	4	na	1	na	13	7

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	34	<1.0	0.01	0.21	1.2	47	<0.1	0.004
June (Riffle)	na	na	<0.03	0.06	na	na	<0.1	0.002
June (Pool)	na	na	na	na	na	na	na	na
July	na	na	0.01	0.02	6.6	82	<1.0	0.050
August	na	na	na	na	na	na	<0.1	0.004
September	na	na	<0.01	<0.01	0.8	na	<0.1	na
October	20	<1.0	0.02	0.08	1.0	42	<0.1	0.002
November	20	<1.0	<0.01	0.02	1.6	43	<0.1	0.000
Median	20	na	0.01	0.06	1.2	45	na	0.003
Maximum	34	na	0.02	0.21	6.6	82	na	0.050
Minimum	20	na	0.01	0.02	0.8	42	na	0.000
Mean	25	na	0.01	0.08	2.2	54	na	0.010
Number	3	na	3	5	5	4	na	6
Standard Deviation	8	na	0.0	0.1	2	19	na	0.019

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Conductivity (umhos/cm) Field	BOD (mg/l)
May	16.7	18.6	7.8	8.10	2.5	590	585	2
June (Riffle)	17.7	20.0	7.6	7.70	1.5	530	500	<2
June (Pool)	na	na	na	na	na	na	na	
July	12.2	20.0	6.8	8.11	na	510	466	<2
August	9.5	23.5	na	7.96	na	490	na	3
September	13.4	19.1	7.1	na	na	490	496	<2
October	12.9	18.3	7.5	7.71	na	520	506	<2
November	4.4	12.5	8.4	7.20	na	550	528	<2
Median	12.9	19.1	7.5	7.84	2.0	520	503	3
Maximum	17.7	23.5	8.4	8.11	2.5	590	585	3
Minimum	4.4	12.5	6.8	7.20	1.5	490	466	2
Mean	12.4	18.9	7.5	7.80	2.0	526	514	3
Number	7	7	6	6	2	7	6	2
Standard Deviation	4	3	1	0.3	1	36	40	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	22	340	3.3	4.0
June (Riffle)	na	320	2.5	3.2
June (Pool)	na	na	na	na
July	16	320	3.0	3.3
August	12	310	3.1	4.1
September	16	280	3.0	3.5
October	17	300	2.8	2.7
November	5	320	2.7	2.7
Median	16	320	3.0	3.3
Maximum	22	340	3.3	4.1
Minimum	5	280	2.5	2.7
Mean	15	313	2.9	3.4
Number	6	7	7	7
Std Dev.	6	19	0.3	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Hellyer Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	307	293	140	na	na
June (Riffle)	727	210	220	na	na
June (Pool)	na	na	na	na	na
July	1,140	53	430	na	na
August	na	na	na	na	na
September	700	150	130	na	na
October	1,000	70	70	na	na
November	1,100	80	270	na	na
Median	864	115	180	na	na
Maximum	1140	293	430	na	na
Minimum	307	53	70	na	na
Mean	829	143	210	na	na
Number	6	6	6	na	na
Standard Deviation	316	94	129	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS Metals

	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
Date	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
May	<0.1	<0.05	0.9	0.9	<0.2	0.15	<1.0	0.6	4.5	4.8
June	<1.0	0.1	1.1	1.0	<0.5	<0.2	1.5	1.3	6.0	3.6
July	na	na	na	na	na	na	na	na	na	na
August	<0.05	<0.05	0.6	0.6	<0.1	<0.2	<0.5	<0.5	5.4	3.2
September	<0.1	<0.1	0.7	0.5	<0.2	<0.2	0.5	<0.5	4.0	3.8
October	<1.0	<1.0	0.7	0.6	<0.5	<0.5	0.7	0.7	3.1	2.9
November	<1.0	<1.0	1.0	0.9	<0.2	<0.2	0.7	<0.5	2.6	0.8
Median	na	0.1	0.8	0.8	na	0.2	0.7	0.7	4.2	3.4
Maximum	na	0.1	1.1	1.0	na	0.2	1.5	1.3	6.0	4.8
Minimum	na	0.1	0.6	0.5	na	0.2	0.5	0.6	2.6	0.8
Mean	na	0.1	0.8	0.8	na	0.2	0.9	0.9	4.3	3.2
Number	na	1	6	6	na	1	4	3	6	6
Standard Deviation	na	na	0.2	0.2	na	na	0.4	0.4	1.3	1.3

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS Metals (cont'd)

	Hg (ug/L)	Hg (ng/L)	Ni (ug/L)		Pb (ug/L)		Se (ug/L)		Zn (ug/L)
Date	Total	Methyl	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
May	0.002	0.049	7.1	7.1	<1.0	0.5	0.6	0.6	74.2
June	<0.002	na	8.0	8.9	1.0	0.6	0.6	0.6	47.0
July	na	na	na	na	na	na	na	na	na
August	<0.002	na	6.7	5.9	0.6	0.5	0.5	0.3	49.1
September	0.002	na	7.0	6.2	0.8	0.6	0.5	0.5	63.6
October	0.002	na	8.0	9.0	1.0	<1.0	0.5	na	88.0
November	<0.002	na	8.3	1.1	0.6	<0.5	0.7*	1.2*	42.4
Median	0.002	0.049	7.6	6.7	0.8	0.5	0.5	0.6	56.4
Maximum	0.002	0.049	8.3	9.0	1.0	0.6	0.6	0.6	88.0
Minimum	0.002	0.049	6.7	1.1	0.6	0.5	0.5	0.3	42.4
Mean	0.002	0.049	7.5	6.4	0.8	0.5	0.5	0.5	60.7
Number	3	1	6	6	5	4	5	4	6
Standard Deviation	0.0	na	1	3	0.2	0.0	0.1	0.1	18

* Values excluded from analyses for exceeding QA/QC criterion for total vs dissolved concentration inversions of $\leq$ 25%

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na
August	na	na	46.6	na	26.6	na	226	na
September	178	161	46.4	44.4	28.4	26.2	233	na
October	163	na	48.3	na	27.2	na	233	170
November	166	na	47.7	na	30.4	na	244	200
Median	166	161	47.2	44.4	27.8	26.2	233	185
Maximum	178	161	48.3	44.4	30.4	26.2	244	200
Minimum	163	161	46.4	44.4	26.6	26.2	226	170
Mean	169	161	47.3	44.4	28.2	26.2	234	185
Number	3	1	4	1	4	1	4	2
Standard Deviation	8	na	0.9	na	2	na	7	21

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	202	1.5	0.30	0.84	8.5	135	0.8	0.006
June	na	na	0.33	0.57	na	na	0.7	0.005
July	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	0.8	0.005
September	na	na	0.46	0.74	10.1	na	1.2	na
October	202	1.8	0.88	1.10	11.3	110	0.2	0.001
November	193	3.9	1.10	1.40	12.7	116	<0.1	0.000
Median	202	1.8	0.46	0.84	10.7	116.0	0.8	0.005
Maximum	202	3.9	1.10	1.40	12.7	135.0	1.2	0.006
Minimum	193	1.5	0.30	0.57	8.5	110.0	0.2	0.000
Mean	199	2.4	0.61	0.93	10.6	120.3	0.7	0.003
Number	3	3	5	5	4	3	5	5
Standard Deviation	5	1	0.4	0.3	2	13	0.4	0.003

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Conductivity (umhos/cm) Field	BOD (mg/l)
May	0.7	23.2	7.1	7.20	na	1300	1305	9
June	0.9	24.1	6.7	7.10	na	1300	1305	<2
July	na	na	na	na	na	na	na	na
August	0.6	25.9	na	7.03	na	1260	na	<2
September	0.8	26.2	6.3	na	na	1270	1303	na
October	0.8	25.7	6.5	6.87	na	1300	1287	5
November	0.6	23.4	5.9	6.50	na	1320	1318	<2
Median	0.8	24.9	6.5	7.030	na	1300	1305	7
Maximum	0.9	26.2	7.1	7.200	na	1320	1318	9
Minimum	0.6	23.2	5.9	6.500	na	1260	1287	5
Mean	0.7	24.8	6.5	6.940	na	1292	1304	7
Number	6	6	5	5	na	6	5	2
Standard Deviation	0.1	1.3	0.4	0.3	na	22	11	3

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	<2	780	9.3	9.8
June	na	770	8.3	9.5
July	na	na	na	na
August	<2	730	8.2	8.5
September	<2	780	9.8	9.8
October	<2	760	8.1	8.5
November	<2	760	6.9	7.3
Median	na	765	8.3	9.0
Maximum	na	780	9.8	9.8
Minimum	na	730	6.9	7.3
Mean	na	763	8.4	8.9
Number	na	6	6	6
Std Dev.	na	19	1.0	1.0

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

TPS Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	<1	<1	<1	<0.1	<0.1
				8	
June	3	<1	<1	na	na
July	na	na	na	1	<0.1
				2.9	
August	na	na	na	1.2	<0.1
				1.7	0.1
September	na	na	na	1.5	<0.1
October	<100	<10	<10	<0.1	<0.1
November	<100	<10	<10	<0.1	0.1
Median	3	na	na	1.6	0.1
Maximum	3	na	na	8	0.1
Minimum	3	na	na	1	0.1
Mean	3	na	na	2.7	0.1
Number	1	na	na	6	2
Standard Deviation	na	na	na	na	na

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank Metals

	Ag (ug/L)		As (ug/L)		Cd (ug/L)		T. Cr (ug/L)		Cu (ug/L)	
Date	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
May	na	na	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	na	na	na	na
September	<0.2	<0.1	0.7	0.6	3.0	2.6	<1.0	0.6	4.9	3.9
October	<1.0	<1.0	0.9	0.8	4.8	4.4	0.7	0.6	4.7	4.0
November	<1.0	<1.0	1.0	0.9	5.9	5.2	<0.5	<0.5	3.6	3.6
Median	na	na	0.9	0.8	4.8	4.4	0.7	0.6	4.7	3.9
Maximum	na	na	1.0	0.9	5.9	5.2	0.7	0.6	4.9	4.0
Minimum	na	na	0.7	0.6	3.0	2.6	0.7	0.6	3.6	3.6
Mean	na	na	0.9	0.8	4.5	4.1	0.7	0.6	4.4	3.8
Number	na	na	3	3	3	3	1	2	3	3
Standard Deviation	na	na	0.2	0.2	1	1	na	0.0	1	0.2

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank Metals (cont'd)

Date	Hg (ug/L) Total	Hg (ng/L) Methyl	Ni (ug/L) Total	Ni (ug/L) Dissolved	Pb (ug/L) Total	Pb (ug/L) Dissolved	Se (ug/L) Total	Se (ug/L) Dissolved	Zn (ug/L) Total
May	na	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	na	na	na
September	0.003	na	9.3	8.8	<1.0	0.6	0.6	0.4	53.0
October	<0.002	na	8.0	8.0	2.0	<1.0	0.5	na	67.0
November	<0.002	na	5.6	5.6	0.9	0.6	0.6	0.5	45.6
Median	0.003	na	8.0	8.0	1.4	0.6	0.6	0.5	53.0
Maximum	0.003	na	9.3	8.8	2.0	0.6	0.6	0.5	67.0
Minimum	0.003	na	5.6	5.6	0.9	0.6	0.5	0.4	45.6
Mean	0.003	na	7.6	7.5	1.4	0.6	0.5	0.5	55.2
Number	1	na	3	3	2	2	3	2	3
Standard Deviation	na	na	2	2	1	0.0	0.1	0.1	11

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank Metals (cont'd)

Date	Na (mg/L) Total	Na (mg/L) Dissolved	Ca (mg/L) Total	Ca (mg/L) Dissolved	Mg (mg/L) Total	Mg (mg/L) Dissolved	Total Hardness (mg/L)	Alkalinity (mg/L)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	na	na
September	na	na	na	na	na	na	na	na
October	159	na	50.2	na	26.8	na	236	190
November	163	na	56.1	na	29.1	na	260	160
Median	161	na	53.2	na	28.0	na	248	175
Maximum	163	na	56.1	na	29.1	na	260	190
Minimum	159	na	50.2	na	26.8	na	236	160
Mean	161	na	53.2	na	28.0	na	248	175
Number	2	na	2	na	2	na	2	2
Standard Deviation	3	na	4	na	2	na	17	21

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank Nutrients and Anions

Date	Cl^- (mg/l)	PO_4^{3-} (mg/l)	ortho-PO_4^{3-} (mg/l)	Total P (mg/l)	NO_3^--N (mg/l)	SO_4^{2-} (mg/l)	NH_3-N (mg/l)	UIA-N (mg/l)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	na	na
September	na	na	na	na	na	na	na	na
October	190	<1.0	0.73	1.00	9.9	112	0.2	0.001
November	174	4.3	1.50	1.80	10.4	110	<0.1	0.000
Median	182	4.3	1.12	1.40	10.2	111	0.2	0.001
Maximum	190	4.3	1.50	1.80	10.4	112	0.2	0.001
Minimum	174	4.3	0.73	1.00	9.9	110	0.2	0.000
Mean	182	4.3	1.12	1.40	10.2	111	0.2	0.001
Number	2	1	2	2	2	2	1	2
Standard Deviation	11	na	1	1	0.4	1	na	0.000

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Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank General Water Quality Parameters

Date	Turbidity (NTU)	Temp (oC)	DO (mg/l)	pH (pHU)	Depth (ft)	Conductivity (umhos/cm) Lab	Field	BOD (mg/l)
May	na	na	na	na	na	na	na	na
June	na	na	na	na	na	na	na	na
July	na	na	na	na	na	na	na	na
August	na	na	na	na	na	na	na	na
September	0.6	na	na	na	na	1220	na	2
October	0.7	25.1	1.8	6.94	na	1300	1270	<2
November	0.8	23.6	3.4	6.80	na	1360	1279	<2
					na			
Median	0.7	24.4	2.6	6.87	na	1300	1275	2
Maximum	0.8	25.1	3.4	6.94	na	1360	1279	2
Minimum	0.6	23.6	1.8	6.80	na	1220	1270	2
Mean	0.7	24.4	2.6	6.87	na	1293	1275	2
Number	3	2	2	2	na	3	2	1
Standard Deviation	0.1	1	1	0.1	na	70	6	na

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Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank General Water Quality Parameters (cont'd)

Date	TSS (mg/l)	TDS (mg/l)	DOC-Low (mg/l)	TOC-Low (mg/l)
May	na	na	na	na
June	na	na	na	na
July	na	na	na	na
August	na	na	na	na
September	2	760	7.6	7.7
October	<2	760	6.9	7.1
November	<2	760	8.1	9.7
Median	2	760	7.6	7.7
Maximum	2	760	8.1	9.7
Minimum	2	760	6.9	7.1
Mean	2	760	7.5	8.2
Number	1	3	3	3
Std Dev.	na	0.0	1	1

2000 Streamflow Augmentation Pilot Project
Coyote Creek Dry Weather Season Sampling Results

Storage Reservoir Tank Pathogens

Date	Total Coliforms (colonies/100ml)	Fecal Coliforms (colonies/100ml)	Enterococcus (colonies/100ml)	*Giardia* (oocysts/10L)	*Cryptosporidium* (oocysts/10L)
May	na	na	na	na	na
June	na	na	na	na	na
July	na	na	na	na	na
August	na	na	na	na	na
September	910	<10	<10	na	na
October	<100	<10	<10	na	na
November	<100	<10	<10	na	na
Median	910	na	na	na	na
Maximum	910	na	na	na	na
Minimum	910	na	na	na	na
Mean	910	na	na	na	na
Number	1	na	na	na	na
Standard Deviation	na	na	na	na	na